United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Washington State Department of Natural Resources and Washington State University Agricultural Research Center

Soil Survey of Cowlitz County, Washington

How To Use This Soil Survey

General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

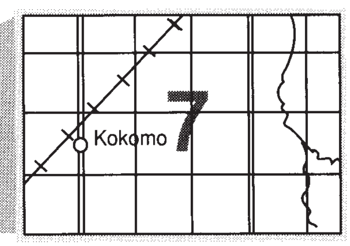
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

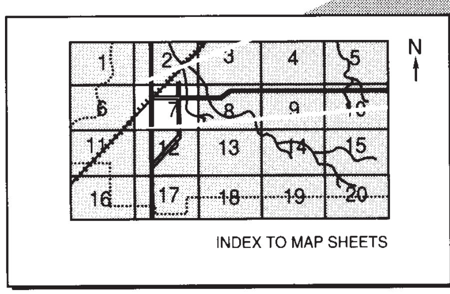
To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

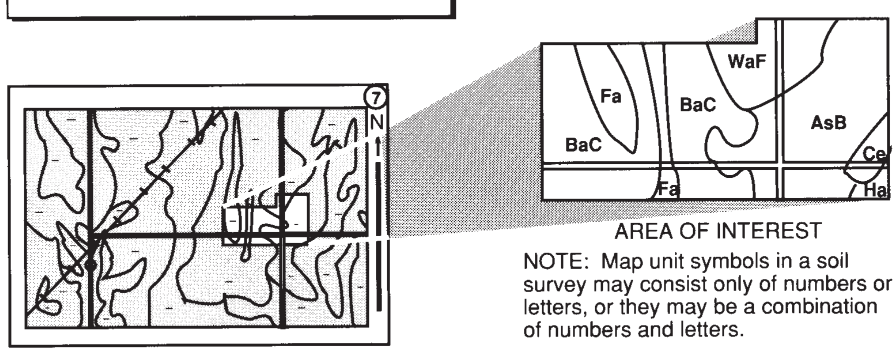
The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



MAP SHEET



INDEX TO MAP SHEETS



MAP SHEET

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1983. Soil names and descriptions were approved in 1988. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1988. This survey was made cooperatively by the Natural Resources Conservation Service and the Washington State Department of Natural Resources and Washington State University Agricultural Research Center. The survey is part of the technical assistance furnished to the Cowlitz County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Since the publication of this survey, more information on soil properties may have been collected, new interpretations may have been developed, or existing interpretive criteria may have been modified. The most current soil information and interpretations for this survey are in the Field Office Technical Guide (FOTG) at the local field office of the Natural Resources Conservation Service. The soil maps in this publication are in digital form. The digitizing of the maps was completed in accordance with the Soil Survey Geographic (SSURGO) database standards. The digital SSURGO-certified maps are considered the official maps for the survey area and are part of the FOTG at the local field office of the Natural Resources Conservation Service.

Cover: Typical area of Caples silty clay loam, 0 to 3 percent slopes, used for alfalfa hay.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov.

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Issued 2006

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Raymond L. Hughbanks
State Conservationist
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Location of Cowlitz County in Washington.

Soil Survey of
Cowlitz County, Washington

By Russell F. Pringle, Natural Resources Conservation Service, and Robert L. Evans, Washington State Department of Natural Resources

Fieldwork by Robert L. Evans, Jeffrey A. Sherwood, Phillip Schoeneburger, Ronald Kurtz, and Robert Puls, Washington State Department of Natural Resources, and Russell F. Pringle, Terry L. Aho, and Jay T. Kehne, Natural Resources Conservation Service

Woodland fieldwork by Gregory S. Fisher, Natural Resources Conservation Service, and George Carnine and Roger Stark, Washington State Department of Natural Resources

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
Washington State Department of Natural Resources and Washington State University Agricultural Research Center

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COWLITZ COUNTY is in the southwestern part of Washington. It has a total area of about 1,139 square miles, or 738,071 acres. The population of the county in 1998 was 93,100. Kelso, the county seat, had a population of 11,950. It is located at the center of the southwestern boundary of the county. Longview and Kalama, which are along the Columbia River, accommodate oceangoing freight vessels and are major shipping ports for forest and agricultural products.

The county is bounded on the west by Wahkiakum County, on the southwest by the Columbia River, on the south by the Lewis River, on the east by Skamania County, and on the north by Lewis County. The county extends 2 to 48 miles from west to east and 14 to 48 miles from north to south.

The foothills of the Cascade Range form the rugged terrain of the eastern one-third of the county. Tributary rivers and streams converge with the Cowlitz River to form relatively flat alluvial bottom land that makes up the Cowlitz River valley in the central one-third of the county. The western one-third of the county is dominantly rugged foothills of the Coast Range. Generally, the streams in this part of the county drain to the south directly into the Columbia River. The Columbia River and its tributaries are influenced by the tides of the Pacific Ocean.

Timber harvesting and forest products manufacturing are the major resource-based enterprises in the county. Significant agricultural enterprises include production of forage for livestock and production of cane berries and flower bulbs.

Soil scientists have identified more than 90 different types of soils in the county. The soils along the major streams are suited to agricultural crop production. In most of these areas, dikes have been constructed to protect the soils from flooding. For maximum crop production, extensive drainage systems have been installed to control the water table. The potential productivity of the forested upland soils is one of the highest in the world.

This survey updates the soil survey of Cowlitz Area, Washington (USDA 1974), the soil survey of St. Helens Tree Farm (Duncan and Steinbrenner 1971), and the unpublished soil survey of Ryderwood Tree Farm. This survey provides additional information and has larger maps, which show the soils in greater detail. It includes a large area of soils on private industrial woodland that previously was unmapped, and it includes changes that occurred as

a result of the eruptions of Mount St. Helens in 1980 and 1982.

General Nature of the County

This section gives general information about the history and development; physiography, relief, and drainage; and climate of the county.

History and Development

The county has served as home and hunting grounds for many different people for centuries. At the time European settlers arrived, the Cowlitz Indians lived throughout the area. Their communal lifestyle, which was based on use of the natural resources in the county, was disrupted as European interest increased. In 1775 Spanish Conquistadors claimed the area. In 1805 Lewis and Clark stated in their journals that the area attracted fur trappers, traders, and settlers. The Hudson's Bay Company had a trading post in the area when the first European settlers arrived in 1849. Monticello became the first county seat in 1853, but the village was later abandoned.

Forest products manufacturing and shipping have been the major industries in the county for 150 years. Today the area is a gateway to a variety of recreation areas as well as an important transportation hub along the Lower Columbia River.

Physiography, Relief, and Drainage

The county can be divided into four distinct physiographic areas—the Cascade Range foothills, Lower Cowlitz Basin, Lower Columbia Basin, and Coast Range foothills. The Cascade Range foothills are steep-sided ridges that generally run west-northwest from the west slopes of the Mount St. Helens Volcano, the summit of which is in Skamania County. Elevation of these foothills ranges from about 1,200 feet above sea level near Toutle to about 4,600 feet on the ridgetops. The major streams that drain this area include the North Fork and South Fork of the Toutle River and the Green, Coweeman, Kalama, and Lewis Rivers.

The Lower Cowlitz Basin consists of alluvial valley bottoms, and it serves as the flood plain for many of the drainageways in the foothills of the Cascade and Coast Ranges. Elevation of the Lower Cowlitz Basin ranges from about 20 feet above sea level on the flood plain at the mouth of the Cowlitz River, near Kelso, to about 30 feet above sea level 22 miles upstream, near Olequa Crossing. From the confluence of the Toutle River downstream to its juncture with the Columbia River, spoil from the eruption of Mount St. Helens in 1980 has been dredged from the Cowlitz River and deposited along its banks. The spoil acts as a dike that tends to keep the river from flowing onto the flood plain during periods of high flow. Flooding would still be a common occurrence, however, except for the three large artificial reservoirs on the upper part of the Cowlitz River. The rivers affected by the mudflow and other debris from Mount St. Helens continue to incise and transport large quantities of bedload. This bedload periodically is dredged to keep the Columbia River shipping channels open downstream and is deposited along the Cowlitz River.

The Lower Columbia Basin consists of relatively flat terrain on islands in the Columbia River and alluvial deltas at the mouth of the Lewis and Cowlitz Rivers. Willow Grove Island, parts of Longview, and bottom land at the mouth of the Lewis River have been diked or drained for urban, industrial, and agricultural uses. These areas otherwise would be subject to frequent periods of flooding from storm-water runoff or ocean tides, or both.

The Coast Range foothills drain to the south into the Columbia River. Elevation ranges from about 20 feet above sea level on the narrow valley floor to about 2,600 feet on the ridgetops.

Climate

The climate of the county is tempered by the wind from the Pacific Ocean. Summers are fairly warm, but hot days are rare. Winters are cool, but snow and freezing temperatures are uncommon, except at the higher elevations. In summer, rainfall is extremely light. Precipitation commonly is absent for several weeks. Crops that are actively growing in summer need to be irrigated. Periods of rainfall are frequent during the rest of the year, especially late in fall and in winter.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Cougar and Longview, Washington, in the period 1951 to 1981. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 38 degrees F at Cougar and 41 degrees at Longview and the average daily minimum temperature is 33 degrees at Cougar and 34 degrees at Longview. The lowest temperature on record, which occurred on December 30, 1968, at Cougar and on December 9, 1972, at Longview, is 4 degrees. In summer, the average temperature at Cougar and Longview is 63 degrees and the average daily maximum temperature is

75 degrees. The highest recorded temperature, which occurred on August 10, 1981, at Longview, is 108 degrees.

Growing degree days are shown in table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 116 inches at Cougar and 46 inches at Longview. Of this, 25 percent usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 5.54 inches at Cougar on November 20, 1962. Thunderstorms occur on about 5 days each year, and most occur in summer.

The average seasonal snowfall is about 28 inches at Cougar and 6 inches at Longview. The greatest snow depth at any one time during the period of record was 58 inches at Cougar and 18 inches at Longview. On the average, 10 days at Cougar and 3 days at Longview have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 80 percent. Humidity is higher at night, and the average at dawn is about 90 percent. The sun shines 60 percent of the time possible in summer and 30 percent in winter. The prevailing wind is from the south-southwest. Average windspeed is highest, 7 miles per hour, in spring.

In most winters, one or two storms over the whole area bring strong winds that are sometimes damaging. In some years the accompanying heavy rain results in serious flooding. Every few years a continental airmass from the east results in abnormal temperatures. If this occurs in winter, several consecutive days are well below freezing. If it occurs in summer, a week or longer is sweltering.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some

of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soils Dominantly on Flood Plains and Terraces

Three map units are on these landscape positions. They make up about 12 percent of the survey area.

1. Caples-Clato-Newberg

Very deep, artificially drained and well drained soils; on flood plains

This map unit makes up about 6 percent of the survey area. It is in the west-central part of the county. Slope is 0 to 3 percent. The vegetation is wetland plants and deciduous and coniferous trees. Elevation is 10 to 300 feet. The mean annual precipitation is 40 to 60 inches, the mean annual air temperature is about 50 to 53 degrees F, and the growing season (at 28 degrees) is 200 to 240 days.

Caples soils are very deep and artificially drained. They are on flood plains. They formed in mixed alluvium. Slope is 0 to 3 percent. Typically, these soils are silty clay loam to a depth of 60 inches or more. They are protected from seasonal flooding, but rare periods of flooding can occur.

Clato soils are very deep and well drained. They are on flood plains. They formed in mixed alluvium. Slope is 0 to 3 percent. Typically, these soils are silt loam to a depth of 60 inches or more. These soils are subject to rare periods of flooding.

Newberg soils are very deep and well drained. They are on flood plains. They formed in mixed alluvium. Slope is 0 to 3 percent. Typically, the surface layer is fine sandy loam. The subsoil is fine sandy loam and very fine sandy loam. The substratum to a depth of 60 inches or more is loamy fine sand. These soils are subject to occasional, brief periods of flooding.

Of minor extent in this unit are areas of Carrolls, Cowlitz, Godfrey, Greenwater, Pilchuck, and Snohomish soils.

This unit is used for cropland, hayland, pastureland, woodland (fig. 1), homesites, and industrial development.

2. Kelso-Kalama-Minniece

Very deep, somewhat poorly drained and moderately well drained soils; on terraces and terrace escarpments

This map unit makes up about 3 percent of the survey area. It is in the west-central part of the county, adjacent to the Cowlitz, Lewis, and Columbia Rivers. Slope is 0 to 60 percent. The vegetation is conifers and deciduous trees. Elevation is 50 to 500 feet. The mean annual precipitation is 40 to 60 inches, the mean annual air temperature is about 49 to 53 degrees F, and the growing season (at 28 degrees) is 220 to 240 days.

Kelso soils are very deep and moderately well drained. They are on high terraces. They formed in old alluvium. Slope is 0 to 50 percent. Typically, the surface layer is silt loam. The subsoil to a depth of 60 inches or more is silty clay loam and silt loam. A seasonal high water table is at a depth of 2 to 3 feet in December through March.

Kalama soils are very deep and moderately well drained. They are on high terraces and terrace

Figure 1.—Pastureland and woodland in an area of Caples silty clay loam, 0 to 3 percent slopes.

escarpments. They formed in old gravelly alluvium. Slope is 8 to 60 percent. Typically, the surface layer and subsurface layer are gravelly loam. The subsoil to a depth of 60 inches or more is gravelly clay loam and very gravelly clay loam. A seasonal high water table is at a depth of 2.5 to 5.0 feet in December through March.

Minniece soils are very deep and somewhat poorly drained. They are on terraces. They formed in alluvium. Slope is 0 to 8 percent. Typically, the surface layer is silt loam. The subsoil to a depth of 60 inches or more is silty clay and silty clay loam. A seasonal high water table is at the surface to a depth of 2 feet below the surface in November through May.

Of minor extent in this unit are areas of Coweeman, Godfrey, Rose Valley, and Sara soils.

This unit is used for hayland, pastureland, homesites, wildlife habitat, and woodland.

3. Riverwash-Cowlitz-Delameter

Riverwash, and very deep, somewhat excessively drained soils; on flood plains and terraces

This map unit makes up about 3 percent of the survey area. It is in the northern part of the county, adjacent to the North and South Forks of the Toutle River (fig. 2). Slope is 0 to 30 percent. The vegetation

Figure 2.—Area of general soil map unit 3. The soils in this unit formed in recent alluvium and debris flow from the 1980 eruption of Mount St. Helens.

is willows and grasses. Elevation is 10 to 2,700 feet. The mean annual precipitation is 40 to 110 inches, the mean annual air temperature is about 40 to 51 degrees F, and the growing season (at 28 degrees) is 125 to 240 days.

Riverwash is very deep and somewhat poorly drained to somewhat excessively drained. It is on active river bottoms and flood plains. It formed in alluvium. Slope is 0 to 3 percent. Typically, it consists of stratified cobbles, pebbles, sand, silt, and clay to a depth of 60 inches or more. It is subject to frequent, long periods of flooding in October through July.

Cowlitz soils are very deep and somewhat excessively drained. They are on terraces and flood

plains. They formed in gravelly debris flow and gravelly dredge material over mudflow. Slope is 0 to 30 percent. Typically, these soils are extremely gravelly sand and very gravelly sand to a depth of 60 inches or more. Some areas of these soils are subject to occasional, brief periods of flooding in November through April.

Delameter soils are very deep and somewhat excessively drained. They are on valley floors. They formed in avalanche debris flow. Typically, these soils are extremely gravelly loamy sand to a depth of 60 inches or more.

Of minor extent in this unit are areas of Lacamas, Solo, and Speelyai soils.

This unit is used for or has the potential to be used for wildlife habitat, woodland, pastureland, and recreation.

Soils Dominantly on Warm Terraces and Uplands

Ten map units are on these landscape positions. They make up about 57 percent of the survey area.

4. Loper-Bunker

Very deep and deep, well drained soils; on hillslopes, benches, ridgetops, and mountainslopes

This map unit makes up about 2 percent of the survey area. It is in the northwestern corner of the county. Slope is 5 to 65 percent. The vegetation is conifers. Elevation is 700 to 1,800 feet. The mean annual precipitation is 60 to 110 inches, the mean annual air temperature is 48 to 50 degrees F, and the growing season (at 28 degrees) is 180 to 240 days.

Loper soils are deep and well drained. They are on hillslopes and benches. They formed in colluvium derived from basalt with an admixture of loess and volcanic ash over breccia and tuff. Slope is 20 to 65 percent. Typically, the surface layer is silt loam. The subsoil to a depth of 60 inches or more is loam and clay loam.

Bunker soils are deep and well drained. They are on benches, hillslopes, mountainslopes, and ridgetops. They formed in colluvium derived from basalt and volcanic breccia. Slope is 5 to 65 percent. Typically, the surface layer is silt loam. The subsoil is gravelly clay loam and loam. Fractured basalt is at a depth of 42 inches. Depth to basalt ranges from 40 to 60 inches.

Of minor extent in this unit are areas of Boistfort, Katula, and Swem soils.

This unit is used for pastureland, recreation, watershed, woodland, and wildlife habitat.

5. Zenker-Lytell

Deep, well drained soils; on mountainslopes, hillslopes, and ridgetops

This map unit makes up about 1 percent of the survey area. It is in the western part of the county. Slope is 5 to 90 percent. The vegetation is conifers. Elevation is 800 to 1,800 feet. The mean annual precipitation is 70 to 110 inches, the mean annual air temperature is 48 to 50 degrees F, and the growing season (at 28 degrees) is 200 to 240 days.

Zenker soils are deep and well drained. They are on mountainslopes. They formed in residuum and colluvium derived from sandstone. Slope is 30 to 90 percent. Typically, the surface layer is silt loam and the subsoil is loam. Partly consolidated sandstone is at a depth of 41 inches. Depth to sandstone ranges from 40 to 60 inches.

Lytell soils are deep and well drained. They are on hillslopes and ridgetops. They formed in residuum and colluvium derived from siltstone and sandstone. Slope is 5 to 75 percent. Typically, the surface layer is silt loam and the subsoil is silty clay loam. Partly consolidated, fractured, highly weathered siltstone is at a depth of 55 inches. Depth to siltstone ranges from 40 to 60 inches.

Of minor extent in this unit are areas of Astoria and Elochoman soils.

This unit is used for recreation, watershed, woodland, and wildlife habitat.

6. Centralia-Buckpeak

Very deep, well drained soils; on hillslopes, plateaus, and ridgetops

This map unit makes up about 5 percent of the survey area. It is in the western part of the county. Slope is 0 to 90 percent. The vegetation is conifers. Elevation is 200 to 1,800 feet. The mean annual precipitation is 40 to 70 inches, the mean annual air temperature is 49 to 52 degrees F, and the growing season (at 28 degrees) is 175 to 240 days.

Centralia soils are very deep and well drained. They are on hillslopes, plateaus, and ridgetops. They formed in residuum and colluvium derived from sandstone. Slope is 0 to 30 percent. Typically, the surface layer is silt loam. The subsoil is clay loam. The substratum to a depth of 60 inches or more is loam.

Buckpeak soils are very deep and well drained. They are on hillslopes and ridgetops. They formed in residuum and colluvium derived from siltstone and sandstone. Slope is 30 to 90 percent. Typically, the surface layer and subsurface layer are silt loam. The

subsoil is silt loam. The substratum to a depth of 60 inches or more is silty clay loam.

Of minor extent in this unit are areas of Astoria, Elochoman, Lytell, Melbourne, Vader, and Zenker soils.

This unit is used for cropland, pastureland, woodland, homesites, and wildlife habitat.

7. Germany-Raught

Very deep and deep, well drained soils; on mountainslopes, hillslopes, ridgetops, benches, and plateaus

This map unit makes up about 6 percent of the survey area. It is in the western part of the county. Slope is 0 to 90 percent. The vegetation is conifers. Elevation is 200 to 1,500 feet. The mean annual precipitation is 50 to 70 inches, the mean annual air temperature is 48 to 51 degrees F, and the growing season (at 28 degrees) is 200 to 240 days.

Germany soils are very deep and deep and are well drained. They are on plateaus, ridgetops, benches, and hillslopes. They formed in residuum and colluvium derived from basalt and tuff with a mantle of loess and volcanic ash. Slope is 0 to 65 percent. Typically, these soils are silt loam to a depth of 60 inches or more. In some areas tuffaceous material is at a depth of 40 to 60 inches.

Raught soils are very deep and well drained. They are on hillslopes and mountainslopes. They formed in residuum and colluvium derived from basalt with an admixture of volcanic ash and loess in the upper part. Slope is 20 to 90 percent. Typically, the surface layer is silt loam. The upper part of the subsoil is silt loam, and the lower part to a depth of 60 inches or more is silty clay loam.

Of minor extent in this unit are areas of Buckpeak, Camas, Centralia, Edgewick, Godfrey, Olequa, Olympic, and Stella soils.

This unit is used for cropland, pastureland, woodland, homesites, recreation, and wildlife habitat.

8. Hazeldell-Olympic

Very deep and deep, well drained soils; on benches, terraces, hillslopes, and mountainslopes

This map unit makes up about 21 percent of the survey area. It is in the central part of the county. Slope is 2 to 65 percent. The vegetation is conifers. Elevation is 200 to 1,800 feet. The mean annual precipitation is 40 to 70 inches, the mean annual air temperature is about 50 to 52 degrees F, the growing season (at 28 degrees) is 175 to 240 days, and the frost-free period is 150 to 200 days.

Hazeldell soils are very deep and deep and are well drained. They are on hillslopes. They formed in residuum and colluvium derived from basalt. Slope is 5 to 65 percent. Typically, the surface layer and subsurface layer are gravelly silt loam. The subsoil is gravelly clay loam and very gravelly clay loam. The substratum to a depth of 60 inches or more is very gravelly clay loam. In some areas tuffaceous material is at a depth of 40 to 60 inches.

Olympic soils are very deep and deep and are well drained. They are on benches, terraces, hillslopes, and mountainslopes. They formed in residuum and colluvium derived from basalt or tuff. Slope is 2 to 65 percent. Typically, the surface layer and subsurface layer are silt loam. The subsoil to a depth of 60 inches or more is silty clay loam and silty clay. In some areas tuffaceous material is at a depth of 40 to 60 inches.

Of minor extent in this unit are areas of Baumgard, Coweeman, Mart, Natal, Olequa, Rose Valley, Sara, Sauvola, Schneider, and Wyant soils.

This unit is used for cropland, pastureland, woodland, watershed, recreation, homesites, and wildlife habitat.

9. Seaquest-Sara

Very deep, moderately well drained and well drained soils; on terraces, terrace escarpments, and hills

This map unit makes up about 5 percent of the survey area. It is in the north-central part of the county. Slope is 0 to 40 percent. The vegetation is conifers. Elevation is 250 to 700 feet. The mean annual precipitation is 45 to 60 inches, the mean annual air temperature is about 48 to 51 degrees F, and the growing season (at 28 degrees) is 175 to 240 days.

Seaquest soils are very deep and well drained. They are on terraces and hills. They formed in old alluvium and sediment derived from tuffaceous siltstone and sandstone. Slope is 0 to 30 percent. Typically, the surface layer is silt loam. The subsoil to a depth of 60 inches or more is silty clay loam.

Sara soils are very deep and moderately well drained. They are on terraces and terrace escarpments. They formed in old alluvium and sediment derived from tuffaceous siltstone and sandstone. Slope is 0 to 40 percent. Typically, the surface layer is silt loam. The subsoil to a depth of 60 inches or more is silty clay loam and silty clay. A seasonal high water table is at a depth of 1 to 2 feet in December through April.

Of minor extent in this unit are areas of Baumgard, Godfrey, Greenwater, Hazeldell, Kosmos, Lacamas,

Olympic, Salkum, Sauvola, Schneider, Semiahmoo, Speelyai, and Wyant soils.

This unit is used for cropland, pastureland, woodland, homesites, recreation, and wildlife habitat.

10. Baumgard-Schneider

Deep, well drained soils; on benches, hillslopes, ridgetops, and mountainslopes

This map unit makes up about 6 percent of the survey area. It is in the northern part of the county. Slope is 5 to 90 percent. The vegetation is conifers. Elevation is 300 to 1,800 feet. The mean annual precipitation is 50 to 75 inches, the mean annual air temperature is about 48 to 50 degrees F, and the growing season (at 28 degrees) is 150 to 225 days.

Baumgard soils are deep and well drained soils. They are on benches, hillslopes, and ridgetops. They formed in volcanic ash and in residuum and colluvium derived from andesite and andesitic volcanic breccia. Slope is 5 to 65 percent. Typically, the surface layer is silt loam. The subsoil is gravelly clay loam and gravelly silty clay loam. Fractured andesite is at a depth of 50 inches. Depth to andesite ranges from 40 to 60 inches.

Schneider soils are deep and well drained. They are on hillslopes and mountainslopes. They formed in residuum and colluvium derived from andesite and andesitic breccia. Slope is 5 to 90 percent. Typically, the surface layer is very gravelly loam. The subsurface layer and subsoil are extremely gravelly loam. Fractured andesite is at a depth of 45 inches. Depth to andesite ranges from 40 to 60 inches.

Of minor extent in this unit are areas of Cinebar, Ferteg, Mulholland, Newaukum, and Siouxon soils.

This unit is used for pastureland, woodland, recreation, watershed, and wildlife habitat.

11. Gobar-Mulholland

Deep and very deep, well drained soils; on benches, toeslopes, hillslopes, mountainslopes, and ridgetops

This map unit makes up about 6 percent of the survey area. It is in the east-central part of the county. Slope is 5 to 90 percent. The vegetation is conifers. Elevation is 500 to 1,800 feet. The mean annual precipitation is 70 to 90 inches, the mean annual air temperature is 48 to 50 degrees F, and the growing season (at 28 degrees) is 175 to 200 days.

Gobar soils are deep and well drained. They are on benches, hillslopes, ridgetops, and mountainslopes. They formed in residuum and colluvium derived from tuff and tuffaceous breccia with a mantle of volcanic ash and loess. Slope is 5 to 90 percent. Typically, these soils are silt loam throughout. Fractured tuff is at a depth of 46 inches. Depth to tuff ranges from 40 to 60 inches.

Mulholland soils are very deep and well drained. They are on benches, toeslopes, mountainslopes, and ridgetops. They formed in residuum and colluvium derived from tuff and tuffaceous breccia with a mantle of volcanic ash and loess. Slope is 5 to 30 percent. Typically, the surface layer is silt loam. The subsoil is silty clay loam. The substratum to a depth of 60 inches or more is silt loam.

Of minor extent in this unit are areas of Baumgard, Cinebar, Newaukum, Schneider, Siouxon, Winston, and Wyant soils.

This unit is used for pastureland, woodland, recreation, watershed, and wildlife habitat.

12. Cinebar-Newaukum-Siouxon

Very deep and deep, well drained soils; on benches, terraces, hillslopes, mountainslopes, and ridgetops

This map unit makes up about 3 percent of the survey area. It is in the eastern part of the county. Slope is 0 to 90 percent. The vegetation is conifers. Elevation is 300 to 1,800 feet. The mean annual precipitation is 60 to 80 inches, the mean annual air temperature is 48 to 50 degrees F, and the growing season (at 28 degrees) is 150 to 200 days.

Cinebar soils are very deep and well drained. They are on benches, terraces, and hillslopes. They formed in volcanic ash over glaciofluvial deposits of volcanic ash. Slope is 0 to 65 percent. Typically, these soils are silt loam to a depth of 60 inches or more.

Newaukum soils are deep and very deep and are well drained. They are on mountainslopes and hillslopes. They formed in colluvium and glaciofluvial deposits derived from volcanic ash, till, and andesite with an admixture of volcanic ash. Slope is 5 to 90 percent. Typically, the surface layer is cobbly silt loam. The subsoil is gravelly silt loam and gravelly loam. The substratum to a depth of 60 inches or more is gravelly silt loam. In some areas tuffaceous material is at a depth of 40 to 60 inches.

Siouxon soils are deep and well drained. They are on mountainslopes and ridgetops. They formed in residuum and colluvium derived from andesite with an admixture of volcanic ash. Slope is 5 to 90 percent. Typically, the surface layer is very cobbly silt loam. The subsoil is very cobbly loam and extremely cobbly loam. The substratum is extremely cobbly loam. Fractured andesite is at a depth of 55 inches. Depth to andesite ranges from 40 to 60 inches.

Of minor extent in this unit are areas of Baumgard, Schneider, Winston, and Wyant soils.

This unit is used for woodland, pastureland, wildlife habitat, homesites, recreation, watershed, and cropland.

13. Yalelake-Zymer

Very deep, well drained soils; on terraces, terrace escarpments, hillslopes, and mountainslopes

This map unit makes up about 2 percent of the survey area. It is in the southeastern part of the county. Slope is 5 to 90 percent. The vegetation is conifers. Elevation is 300 to 1,800 feet. The mean annual precipitation is 80 to 120 inches, the mean annual air temperature is 48 to 50 degrees F, and the growing season (at 28 degrees) is 125 to 200 days.

Yalelake soils are very deep and well drained, They are on hillslopes, terraces, and terrace escarpments. They formed in glaciofluvial deposits of volcanic ash and pumice over pyroclastic material with a mantle of volcanic ash. Slope is 5 to 90 percent. Typically, the surface layer and subsurface layer are sandy loam. The subsoil is gravelly sandy loam and sandy loam. The substratum to a depth of 60 inches or more is stratified sand to gravelly loam.

Zymer soils are very deep and well drained. They are on mountainslopes. They formed in residuum and colluvium derived from volcanic ash and basic igneous rock with a mantle of volcanic ash and some pumice. Slope is 30 to 90 percent. Typically, the surface layer is sandy loam. The upper part of the subsoil is gravelly sandy loam, and the lower part to a depth of 60 inches or more is very gravelly loam and extremely gravelly loam.

Of minor extent in this unit are areas of Cinebar and Newaukum soils.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Soils Dominantly on Cool Terraces and Uplands

Five map units are on these landscape positions. They make up about 21 percent of the survey area.

14. Lates-Murnen

Moderately deep and very deep, well drained soils; on mountainslopes, mountain benches, and ridgetops

This map unit makes up about 1 percent of the survey area. It is in the northwestern part of the county. Slope is 5 to 90 percent. The vegetation is conifers. Elevation is 1,800 to 2,600 feet. The mean annual precipitation is 80 to 110 inches, the mean annual air temperature is 43 to 45 degrees F, and the growing season (at 28 degrees) is 150 to 180 days.

Lates soils are moderately deep and well drained. They are on mountainslopes. They formed in residuum and colluvium derived from basalt. Slope is 5 to 90 percent. Typically, the surface layer is silt loam and the subsoil is gravelly silt loam. Fractured basalt is at a depth of 36 inches. Depth to basalt ranges from 20 to 40 inches.

Murnen soils are very deep and well drained. They are on mountain benches and ridgetops. They formed in residuum derived from saprolitic basalt and volcanic breccia with an admixture of volcanic ash and loess. Slope is 5 to 30 percent. Typically, these soils are silt loam to a depth of 60 inches or more.

Of minor extent in this unit are areas of Andaquepts and Boistfort and Bunker soils.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

15. Pheeney-Beigle

Deep and moderately deep, well drained soils; on benches, mountainslopes, and broad ridgetops

This map unit makes up about 12 percent of the survey area. It is in the east-central part of the county. Slope is 5 to 90 percent. The vegetation is conifers. Elevation is 1,800 to 2,800 feet. The mean annual precipitation is 60 to 100 inches, the mean annual air temperature is 42 to 45 degrees F, and the growing season (at 28 degrees) is 140 to 190 days.

Pheeney soils are moderately deep and well drained. They are on benches, mountainslopes, and broad ridgetops. They formed in residuum and colluvium derived from andesite and andesitic flow breccia with an admixture of volcanic ash. Slope is 5 to 90 percent. Typically, the surface layer and subsurface layer are gravelly silt loam. The subsoil is extremely cobbly silt loam. Fractured andesite is at a depth of 36 inches. Depth to andesite ranges from 20 to 40 inches.

Beigle soils are deep and well drained. They are on mountainslopes and broad ridgetops. They formed in residuum and colluvium derived from andesite and andesitic breccia with a mantle of volcanic ash and loess. Slope is 5 to 65 percent. Typically, the surface layer and subsurface layer are silt loam. The subsoil is silt loam and gravelly silt loam. The substratum is very gravelly loam. Fractured andesite is at a depth of 46 inches. Depth to andesite ranges from 40 to 60 inches.

Of minor extent in this unit are areas of Dobbs, Jonas, Sarazan, Voight, Xeno, and Zynbar soils.

This unit is used for woodland, wildlife habitat, watershed, and recreation.

16. Hoffstadt-Domell

Deep and very deep, well drained soils; on benches, mountainslopes, and ridgetops

This map unit makes up about 4 percent of the survey area. It is in the northeastern part of the county. Slope is 5 to 90 percent. The vegetation is conifers. Elevation is 1,800 to 2,800 feet. The mean annual precipitation is 70 to 90 inches, the mean annual air temperature is 42 to 44 degrees F, and the growing season (at 28 degrees) is 150 to 180 days.

Hoffstadt soils are deep and well drained. They are on mountainslopes, benches, and ridgetops. They formed in residuum and colluvium derived from basalt with a mantle of volcanic ash. Slope is 5 to 90 percent. Typically, the surface layer is very gravelly sandy loam. The subsoil is very gravelly sandy loam and very cobbly sandy loam. The substratum is extremely stony sandy loam. Fractured basalt is at a depth of 47 inches. Depth to basalt ranges from 40 to 60 inches.

Domell soils are very deep and well drained. They are on benches, mountainslopes, and ridgetops. They formed in lahar and mudflow material with a high content of volcanic ash or pumiceous cinders. Slope is 5 to 70 percent. Typically, the surface layer is sandy loam and the subsurface layer is loam. The subsoil is sandy loam. The substratum to a depth of 60 inches or more is loam and sandy loam.

Of minor extent in this unit are areas of Beigle, Dobbs, Pheeney, Xeno, and Zynbar soils.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

17. Studebaker-Forsyth-Lithic Umbric Vitrandepts

Very deep and shallow, well drained and somewhat excessively drained soils; on fans, terraces, terrace escarpments, lava flows, and valley floors

This map unit makes up about 1 percent of the survey area. It is in the eastern part of the county. Slope is dominantly 0 to 90 percent. The vegetation is conifers and scattered shrubs and grasses. Elevation is 500 to 3,200 feet. The mean annual precipitation is 70 to 140 inches, the mean annual air temperature is 38 to 48 degrees F, and the growing season (at 28 degrees) is 70 to 140 days.

Studebaker soils are very deep and somewhat excessively drained. They are on valley floors. They formed in avalanche debris flow material. Slope is 0 to 20 percent. Typically, these soils are very gravelly loamy sand and extremely gravelly loamy sand to a depth of 60 inches or more.

Forsyth soils are very deep and somewhat excessively drained. They are on fans, terraces, and terrace escarpments. They formed in pyroclastic flow material and lahar with an admixture of volcanic ash and pumice. Slope is 0 to 90 percent. Typically, the surface layer is very cobbly loamy sand. The subsoil is very cobbly loamy sand. The substratum to a depth of 60 inches or more is extremely cobbly sand and very gravelly sand.

Lithic Umbric Vitrandepts are shallow and well drained. They are on lava flows. They formed in volcanic ash and pumice over basalt. Slope is 0 to 15 percent. Typically, the surface layer is sandy loam. The subsoil is very gravelly loamy sand. Fractured basalt is at a depth of 11 inches. Depth to basalt ranges from 10 to 20 inches.

Of minor extent in this unit are areas of Andaquepts and Delameter soils.

This unit is used for woodland, wildlife habitat, and watershed. Part of this unit is in the Mount St. Helens National Geologic Monument.

18. Swift-Cinnamon

Very deep, well drained soils; on ridgetops, mountainslopes, and mountain benches

This map unit makes up about 3 percent of the survey area. It is in the southeastern part of the county. Slope is 5 to 90 percent. The vegetation is conifers. Elevation is 1,600 to 2,800 feet. The mean annual precipitation is 90 to 135 inches, the mean annual air temperature is 42 to 45 degrees F, and the growing season (at 28 degrees) is 125 to 175 days.

Swift soils are very deep and well drained. They are on mountainslopes and ridgetops. They formed in residuum and colluvium derived from volcanic ash and andesite with a mantle of volcanic ash and cinders. Slope is 5 to 90 percent. Typically, the surface layer is sandy loam. The subsoil to a depth of 60 inches or more is gravelly sandy loam and extremely cobbly loam.

Cinnamon soils very deep and well drained. They are on mountainslopes, mountain benches, and ridgetops. They formed in pyroclastic flows of volcanic ash and pumice over older, weathered tephra. Slope is 5 to 90 percent. Typically, these soils are sandy loam to a depth of 60 inches or more.

Of minor extent in this unit are areas of Beigle, Dobbs, and Pheeney soils.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

Soils Dominantly on Cold Terraces and Uplands

Three map units are on these landscape positions. They make up about 10 percent of the survey area.

19. Stahl-Reichel

Moderately deep and deep, well drained soils; on ridgetops and mountainslopes

This map unit makes up about 1 percent of the survey area. It is in the northeastern part of the county. Slope is 5 to 75 percent. The vegetation is conifers. Elevation is 2,600 to 4,500 feet. The mean annual precipitation is 70 to 100 inches, the mean annual air temperature is 39 to 43 degrees F, and the growing season (at 28 degrees) is 140 to 160 days.

Stahl soils are moderately deep and well drained. They are on ridgetops and mountainslopes. They formed in residuum and colluvium derived from andesite and andesitic volcanic breccia with an admixture of volcanic ash. Slope is 5 to 75 percent. Typically, the surface layer is very gravelly silt loam and the subsurface layer is extremely gravelly silt loam. The subsoil is extremely cobbly silt loam. Fractured andesite is at a depth of 36 inches. Depth to andesite ranges from 20 to 40 inches.

Reichel soils are deep and well drained. They are on ridgetops and mountainslopes. They formed in residuum and colluvium derived from andesite with a mantle of volcanic ash. Slope is 5 to 65 percent. Typically, the surface layer is silt loam. The subsoil is gravelly loam. The substratum is very cobbly loam. Fractured andesite is at a depth of 53 inches. Depth to andesite ranges from 40 to 60 inches.

Of minor extent in this unit are areas of Beigle, Dobbs, Pheeney, and Zynbar soils.

This unit is used for woodland, wildlife habitat, and recreation.

20. Vanson-Hatchet-Lonestar

Very deep to moderately deep, well drained soils; on mountainslopes and ridgetops

This map unit makes up about 8 percent of the survey area. It is in the eastern part of the county. Slope is 5 to 90 percent. The vegetation is conifers. Elevation is 2,600 to 4,500 feet. The mean annual precipitation is 80 to 130 inches, the mean annual air temperature is 38 to 40 degrees F, and the growing season (at 28 degrees) is 90 to 140 days.

Vanson soils are deep and very deep and are well drained. They are on mountainslopes and ridgetops. They formed in residuum and colluvium derived from igneous rock with a mantle of volcanic ash and pumice. Slope is 5 to 90 percent. Typically, the surface layer is loamy sand. The subsoil is sandy loam, gravelly loamy sand, very gravelly loamy sand, and very gravelly sand. Andesite is at a depth of 51 inches. Depth to andesite ranges from 40 to 60 inches.

Hatchet soils are moderately deep and well drained. They are on mountainslopes and ridgetops. They formed in residuum and colluvium derived from andesite with a mantle of volcanic ash and pumice. Slope is 30 to 90 percent. Typically, the surface layer is sandy loam. The subsoil is very cobbly sandy loam and extremely cobbly loam. The substratum is extremely cobbly sandy loam. Fractured andesite is at a depth of 36 inches. Depth to andesite ranges from 20 to 40 inches.

Lonestar soils are deep and very deep and are well drained. They are on mountainslopes and ridgetops. They formed in volcanic ash and pumice over colluvium derived from basic igneous rock. Slope is 5 to 90 percent. Typically, the surface layer is loamy sand. The subsoil sandy loam. The substratum is loamy sand. Below this to a depth of 60 inches or more is sandy loam.

Of minor extent in this unit are areas of Cinnamon, Domell, Hoffstadt, Swift, and Zenker soils.

This unit is used for woodland, wildlife habitat, recreation, and watershed.

21. Polepatch-Andic Cryumbrepts

Very deep and deep, well drained and somewhat excessively drained soils; on alluvial fans, terraces, terrace escarpments, and cirque headwalls

This map unit makes up about 1 percent of the survey area. It is in the eastern part of the county. Slope is 0 to 90 percent. The vegetation is conifers. Elevation is 2,800 to 4,500 feet. The mean annual precipitation is 90 to 130 inches, the mean annual air temperature is 38 to 42 degrees F, and the growing season (at 28 degrees) is 90 to 140 days.

Polepatch soils are very deep and somewhat excessively drained. They are on alluvial fans, terraces, and terrace escarpments. They formed in pyroclastic flow material and lahar with a mantle of

volcanic ash and pumice. Slope is 0 to 90 percent. Typically, the surface layer is very cobbly loamy sand. Below this to a depth of 60 inches or more are very cobbly loamy sand and extremely cobbly sand.

Andic Cryumbrepts soils are deep and very deep and are well drained. They are on cirque headwalls. They formed in colluvium derived from andesite, basalt, volcanic breccia, and volcanic ash. Slope is 50 to 90 percent. Typically, the surface layer is gravelly loam. The subsoil and substratum to a depth of 40 inches or more are cobbly loam.

Of minor extent in this unit are areas of Andic Cryaquepts, Histic Cryaquepts, Lithic Umbric Vitrandepts, and Spodic Cryopsamments.

This unit is used for recreation, wildlife habitat, woodland, and watershed.

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading "Use and Management of the Soils."

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Germany silt loam, 0 to 8 percent slopes, is a phase of the Germany series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Katula-Bunker complex, 30 to 65 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Riverwash is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

1—Andaquepts, 0 to 3 percent slopes

Composition

Andaquepts and similar soils—90 percent
Contrasting soils—10 percent

Setting

Position on landscape: Basins
Parent material: Volcanic ash, volcanic breccia, basalt
Slope range: 0 to 3 percent
Elevation: 1,200 to 3,500 feet
Mean annual precipitation: 70 to 120 inches
Mean annual air temperature: 44 degrees F
Growing season: 125 to 175 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Reference Profile

0 to 12 inches—dark reddish brown loam
12 to 37 inches—mottled, dark brown to grayish brown clay loam, gravelly loam, or very gravelly sandy loam
37 to 60 inches—mottled clay loam, loam, or clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained to very poorly drained
Permeability: Slow
Available water capacity: High
Potential rooting depth: 10 to 20 inches because of wetness
Runoff: Slow
Hazard of water erosion: None
High water table: Kind—apparent; depth—at the surface to a depth of 0.5 foot below the surface; months—November through April
Hazard of flooding: None

Included Areas

- Soils that are well drained
- Soils that have slopes of more than 3 percent

Major Uses

Watershed, wetland wildlife habitat

Major Management Factors

- Year-round wetness

Interpretive Groups

Capability subclass: 6w

2—Andic Cryaquepts-Rock outcrop complex, 50 to 90 percent slopes

Composition

Andic Cryaquepts and similar soils—65 percent
Rock outcrop—15 percent
Contrasting inclusions—20 percent

Setting

Position on landscape: Cirque headwalls
Slope range: 50 to 90 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 90 to 130 inches
Mean annual air temperature: 39 to 41 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: November through May

Andic Cryaquents

Reference profile

2 inches to 0—organic mat
0 to 11 inches—mottled gravelly sandy loam
11 to 35 inches—mottled gravelly loam or very gravelly loamy sand
35 to 60 inches—mottled very gravelly loam or very cobbly sandy loam

Soil properties and qualities

Parent material: Volcanic ash and pumice over andesite and basalt
Depth class: Moderately deep to very deep
Drainage class: Poorly drained
Permeability: Moderate and moderately rapid
Available water capacity: Moderate
Potential rooting depth: 20 to 80 inches
Runoff: Rapid
Hazard of water erosion: Severe
High water table: Kind—apparent; depth—0.5 foot to 1.5 feet; months—November through June
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs and dikes of andesite and basalt

Included Areas

- Soils that have slopes of less than 50 percent
- Soils that are well drained
- Soils that have bedrock at a depth of 80 inches or more

Major Uses

Watershed, wildlife habitat

Major Management Factors

- Slope
- Year-round wetness

Interpretive Groups

Capability subclass: Andic Cryaquepts—7e; Rock outcrop—8s

3—Andic Cryumbrepts-Rock outcrop complex, 50 to 90 percent slopes

Composition

Andic Cryumbrepts and similar soils—65 percent
Rock outcrop—15 percent
Contrasting soils—20 percent

Setting

Position on landscape: Cirque headwalls
Slope range: 50 to 90 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 90 to 130 inches
Mean annual air temperature: 39 to 41 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: November through May

Andic Cryumbrepts

Reference profile

3 inches to 0—organic mat
0 to 17 inches—very dark brown gravelly loam
17 to 39 inches—dark brown cobbly loam
39 to 60 inches—brown cobbly loam

Soil properties and qualities

Parent material: Colluvium derived from andesite, basalt, volcanic breccia, and volcanic ash
Depth class: Deep and very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs and dikes of andesite and basalt

Included Areas

- Soils that are wet
- Soils that have slopes of less than 50 percent
- Soils that have bedrock at a depth of less than 40 inches

Major Uses

Recreation, watershed, wildlife habitat, woodland

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, Pacific silver fir, noble fir
Minor tree species: Alaska cedar
Major understory species: Vine maple, common beargrass, western brackenfern, huckleberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction and erosion can be minimized by using the appropriate cable yarding systems.
- Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil compaction and erosion.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restriction to planting: Rock outcrop
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Andic Cryumbrepts—7e; Rock outcrop—8s

4—Andic Cryumbrepts, overblown-Rock outcrop complex, 50 to 90 percent slopes

Composition

Andic Cryumbrepts, overblown, and similar soils—65 percent
Rock outcrop—15 percent
Contrasting soils—20 percent

Setting

Position on landscape: Cirque headwalls
Slope range: 50 to 90 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 90 to 130 inches
Mean annual air temperature: 39 to 41 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: November through May

Andic Cryumbrepts, Overblown

Reference profile

0 to 5 inches—dark gray loamy sand
5 to 23 inches—very dark brown sandy loam
23 to 35 inches—dark brown very cobbly loam or very cobbly clay loam
35 to 60 inches—brown cobbly loam, loam, or very cobbly clay loam

Soil properties and qualities

Parent material: Colluvium derived from andesite, basalt, volcanic breccia, and volcanic ash
Depth class: Deep and very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs and dikes of andesite and basalt

Included Areas

• Soils that are wet
• Soils that have slopes of less than 50 percent
• Soils that have bedrock at a depth of less than 40 inches
• Soils that do not have a loamy sand surface layer

Major Uses

Recreation, watershed, wildlife habitat, woodland

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Vine maple, common beargrass, western brackenfern, huckleberry, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
• Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil compaction and erosion.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they

require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restrictions to planting: Rock outcrop, deposits of volcanic ash on surface
General management considerations:
• Plant tree roots in pre-1980 soil material. In areas that have a thin accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying, pre-1980 soil material.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Andic Cryumbrepts, overblown—7e; Rock outcrop—8s

5—Arents, 0 to 5 percent slopes

Composition

Arents and similar soils—95 percent
Contrasting soils—5 percent

Setting

Position on landscape: Hills, mountains, flood plains
Parent material: Mixed material derived from various sources
Slope range: 0 to 5 percent
Elevation: 20 to 2,000 feet
Mean annual precipitation: 40 to 80 inches
Mean annual air temperature: 44 to 52 degrees F
Growing season: 90 to 200 days (28 degrees F)

Reference Profile

0 to 10 inches—very gravelly sandy loam
10 to 60 inches—extremely gravelly sandy loam, very gravelly silt loam, or gravelly loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained to somewhat poorly drained
Permeability: Moderate to moderately rapid
Available water capacity: Low to high
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: 2 feet or more in October through May
Hazard of flooding: None

Included Areas

• Various soils in surrounding areas that have not been disturbed
• Soils that have slopes of more than 5 percent
• Soils that are wet

Major Uses

Urban and industrial development

Interpretive Groups

Capability subclass: 4s

6—Astoria silt loam, 5 to 30 percent slopes

Composition

Astoria and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Hillslopes
Parent material: Siltstone
Slope range: 5 to 30 percent
Elevation: 800 to 1,400 feet
Mean annual precipitation: 80 to 110 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 15 inches—dark brown silt loam
15 to 60 inches—dark yellowish brown silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: 5 feet or more
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 30 percent
- Soils that are more than 20 percent siltstone fragments throughout
- Soils that are silt loam throughout

Major Uses

Pastureland, woodland, wildlife habitat, watershed

Pastureland

General management considerations:
- Steepness of slope is the main limitation.
- Grasses and legumes grow well if they are adequately fertilized.
- The most suitable irrigation method is a sprinkler system.
- Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Provide supplemental irrigation in years of limited precipitation.
- Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, Sitka spruce, bigleaf maple
Major understory species: Cascade Oregongrape, Oregon oxalis, salal, salmonberry, western swordfern, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

7—Baumgard silt loam, 5 to 30 percent slopes

Composition

Baumgard and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Benches, hillslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite or andesitic volcanic breccia
Slope range: 5 to 30 percent
Elevation: 400 to 1,200 feet
Mean annual precipitation: 60 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 150 to 225 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 11 inches—dark brown silt loam
11 to 18 inches—dark brown gravelly clay loam
18 to 33 inches—dark brown gravelly clay loam
33 to 50 inches—yellowish red gravelly silty clay loam
50 inches—finely fractured andesite

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Medium

Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that are more than 35 percent rock fragments throughout
• Soils that have slopes of more than 30 percent
• Soils that have bedrock at a depth of more than 60 inches
• Soils that are wet

Major Uses

Pastureland, woodland, wildlife habitat, watershed

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, salmonberry, western brackenfern, red huckleberry, vine maple, red elderberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

8—Baumgard silt loam, 30 to 65 percent slopes

Composition

Baumgard and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Benches, hillslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite and andesitic volcanic breccia
Slope range: 30 to 65 percent
Elevation: 400 to 1,800 feet
Mean annual precipitation: 60 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 150 to 225 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 11 inches—dark brown silt loam
11 to 18 inches—dark brown gravelly clay loam
18 to 33 inches—dark brown gravelly clay loam
33 to 50 inches—yellowish red gravelly silty clay loam
50 inches—finely fractured andesite

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate

Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that are more than 35 percent rock fragments throughout
- Soils that have slopes of less than 30 percent
- Soils that have bedrock at a depth of more than 60 inches
- Soils that are wet

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, salmonberry, western brackenfern, red huckleberry, vine maple, red elderberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

9—Beigle silt loam, 5 to 30 percent slopes

Composition

Beigle and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite and andesitic breccia with a mantle of volcanic ash and loess
Slope range: 5 to 30 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 70 to 100 inches
Mean annual air temperature: 42 to 45 degrees F
Growing season: 140 to 190 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 13 inches—very dark brown silt loam
13 to 17 inches—dark brown silt loam
17 to 25 inches—dark yellowish brown silt loam
25 to 42 inches—brown gravelly silt loam
42 to 46 inches—brown very gravelly loam
46 inches—highly fractured, weathered andesite

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that are 35 to 70 percent rock fragments
- Soils that have bedrock at a depth of less than 40 inches
- Soils that have slopes of more than 30 percent
- Soils that are wet

Major Uses

Woodland, wildlife, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Vine maple, cascade Oregongrape, red huckleberry, western swordfern, trailing blackberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

10—Beigle silt loam, 30 to 65 percent slopes

Composition

Beigle and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from andesite and andesitic breccia with a mantle of volcanic ash and loess
Slope range: 30 to 65 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 70 to 100 inches
Mean annual air temperature: 42 to 45 degrees F
Growing season: 140 to 190 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 13 inches—very dark brown silt loam
13 to 17 inches—dark brown silt loam
17 to 25 inches—dark yellowish brown silt loam
25 to 42 inches—brown gravelly silt loam
42 to 46 inches—dark brown very gravelly loam
46 inches—highly fractured, weathered andesite

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that are 35 to 70 percent rock fragments
- Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
- Soils that have slopes of less than 30 percent or more than 65 percent
- Soils that are wet

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Vine maple, cascade Oregongrape, red huckleberry, western swordfern, trailing blackberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

11—Boistfort silt loam, 5 to 30 percent slopes

Composition

Boistfort and similar soils—90 percent
Contrasting soils—10 percent

Setting

Position on landscape: Hillslopes
Parent material: Residuum derived from basalt and breccia
Slope range: 5 to 30 percent
Elevation: 800 to 1,800 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 16 inches—dark brown silt loam
16 to 20 inches—dark brown silty clay loam
20 to 27 inches—reddish brown silty clay loam
27 to 60 inches—yellowish red silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have bedrock at a depth of less than 60 inches

Major Uses

Pastureland, woodland, wildlife habitat, watershed

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, western hemlock, red alder
Minor tree species: Western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, salmonberry, vine maple, western swordfern, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

12—Buckpeak silt loam, 30 to 65 percent slopes

Composition

Buckpeak and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Hillslopes, ridgetops
Parent material: Residuum and colluvium derived from siltstone and fine-grained sandstone
Slope range: 30 to 65 percent
Elevation: 200 to 1,800 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 49 to 52 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 12 inches—very dark brown silt loam
12 to 21 inches—dark brown silt loam
21 to 37 inches—dark yellowish brown silt loam that is 25 percent soft siltstone fragments
37 to 60 inches—dark yellowish brown and brown silty clay loam that is 40 to 75 percent soft siltstone fragments

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that do not have siltstone or sandstone fragments in the profile
• Soils that are more than 35 percent clay
• Soils that are somewhat poorly drained
• Soils that have slopes of more than 65 percent

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, bigleaf maple, western redcedar

Major understory species: Cascade Oregongrape, western swordfern, salal, trailing blackberry, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

13—Buckpeak silt loam, 65 to 90 percent slopes

Composition

Buckpeak and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Hillslopes
Parent material: Residuum and colluvium derived from siltstone and fine grained sandstone
Slope range: 65 to 90 percent
Elevation: 200 to 1,800 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 49 to 52 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 12 inches—very dark brown silt loam
12 to 21 inches—dark brown silt loam
21 to 37 inches—dark yellowish brown silt loam that is 25 percent soft siltstone fragments
37 to 60 inches—dark yellowish brown and brown silty clay loam that is 40 to 75 percent soft siltstone fragments

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that do not have siltstone or sandstone fragments in the profile
- Soils that are more than 30 percent clay
- Soils that are somewhat poorly drained
- Soils that have slopes of less than 65 percent

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, bigleaf maple, western redcedar
Major understory species: Cascade Oregongrape, western swordfern, salal, trailing blackberry, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

14—Bunker silt loam, 5 to 30 percent slopes

Composition

Bunker and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Benches, ridgetops, hillslopes
Parent material: Residuum and colluvium derived from basalt and breccia
Slope range: 5 to 30 percent
Elevation: 800 to 1,800 feet
Mean annual precipitation: 70 to 110 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 12 inches—brown silt loam
12 to 27 inches—brown gravelly clay loam
27 to 42 inches—brown clay loam
42 inches—fractured basalt

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
• Soils that have siltstone fragments in the subsoil
• Soils that have slopes of more than 30 percent

Major Uses

Pastureland, woodland, wildlife habitat, watershed

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Western swordfern, cascade Oregongrape, salal, red huckleberry, salmonberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

15—Bunker silt loam, 30 to 65 percent slopes

Composition

Bunker and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Colluvium derived from basalt and breccia
Slope range: 30 to 65 percent
Elevation: 800 to 1,800 feet
Mean annual precipitation: 70 to 110 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 12 inches—dark brown silt loam
12 to 27 inches—brown gravelly clay loam
27 to 42 inches—brown loam
42 inches—fractured basalt

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
• Soils that have slopes of less than 30 percent
• Soils that have siltstone fragments in the subsoil

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Western swordfern, cascade Oregongrape, salal, red huckleberry, salmonberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they

require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

16—Camas cobbly loam, 0 to 3 percent slopes

Composition

Camas and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Flood plains
Parent material: Mixed alluvium
Slope range: 0 to 3 percent
Elevation: 50 to 500 feet
Mean annual precipitation: 45 to 70 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 4 inches—very dark brown cobbly loam
4 to 22 inches—very dark brown very cobbly loam
22 to 60 inches—dark brown very cobbly loamy sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Moderately rapid in the upper 22 inches and very rapid below
Available water capacity: Low
Potential rooting depth: 20 to 40 inches
Runoff: Very slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: Frequency—occasional; duration—brief; months—November through May

Included Areas

• Soils that are wet
• Soils that do not have rock fragments

Major Uses

Pastureland, woodland, wildlife habitat, recreation

Pastureland

General management considerations:
• Grasses and legumes grow well if they are adequately fertilized.
• Low available water capacity is the main limitation.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Bigleaf maple, western redcedar
Major understory species: Western brackenfern, vine maple, salal, cascade Oregongrape, western hazel

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: Cobbles in the soil
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.

• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4s

17—Caples silty clay loam, 0 to 3 percent slopes

Composition

Caples and similar soils—90 percent
Contrasting soils—10 percent

Setting

Position on landscape: Flood plains
Parent material: Mixed alluvium
Slope range: 0 to 3 percent
Elevation: 15 to 40 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 4 inches—dark brown silty clay loam
4 to 9 inches—mottled, dark brown silty clay loam
9 to 25 inches—mottled, gray silty clay loam
25 to 39 inches—mottled, grayish brown silty clay loam
39 to 44 inches—mottled, dark gray silty clay loam
44 to 60 inches—mottled, gray silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Artificially drained
Permeability: Slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
High water table: Kind—apparent; depth—1.5 to 2.5 feet; months—November through April
Frequency of flooding: Rare

Included Areas

• Soils that are well drained
• Soils that are sandy throughout
• Soils that have organic layers in the profile
• Soils that have a silt loam surface layer

Major Uses

Cropland, pastureland, homesites, woodland

Cropland and Pastureland

General management considerations:
• The apparent high water table and hazard of flooding are the main limitations.
• Most climatically adapted crops can be grown if adequate drainage is maintained and the soil is protected from flooding.
• Grasses and legumes grow well if they are adequately fertilized.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• Wetness limits the period of grazing and the production of deep-rooted crops.
• A tillage pan forms easily if the soil is tilled when wet.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Either select plants that tolerate wetness or maintain drainage.
• Seed only the hay and pasture plants that tolerate periodic inundation and seasonal wetness.
• Maintain tile drains to reduce wetness if a suitable outlet is available.
• Maintain open ditches or tile drains to remove water on or near the surface.
• Provide irrigation and maintain drainage if management is intensive.
• Provide supplemental irrigation in years of limited precipitation.
• Because of the slow permeability of the subsoil, regulate the application of irrigation water so that water does not stand on the surface and damage the crops.
• Increase the water intake rate by rotating crops and keeping tillage at a minimum.
• Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures, by rotating crops, and by growing cover crops.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures, by rotating crops, and by keeping tillage at a minimum.
• Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
• Septic tank absorption field may function poorly because of wetness late in winter and in spring and the slow permeability of the soil.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Reduce wetness by providing drainage around buildings with basements and crawl spaces and by installing drain tile around footings.
• Reduce the risk of flooding by locating structures above the expected flood level.
• Prevent structural damage that results from shrinking and swelling by properly designing and building foundations, concrete structures, and paved areas and by backfilling with material that has low shrink-swell potential.
• Compensate for the slow permeability by increasing the size of the absorption field and backfilling trenches with porous material.
• Protect onsite sewage systems from flooding.
• Install culverts to carry seasonal runoff in areas where roads cross natural drainageways.
• Irrigate lawn grasses, shrubs, vines, trees, and ornamental trees in summer.
• Provide drainage for best results with most lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens.
• Mulch, fertilize, and irrigate to establish lawns.

Woodland

Composition

Principal tree species: Red alder
Minor tree species: Black cottonwood, bigleaf maple
Major understory species: Douglas spirea, willow, sedges

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: High water table
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 3w

18—Carrolls sand, flooded, 0 to 2 percent slopes

Composition

Carrolls and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Swales, flood plains, low terraces
Parent material: Sandy dredge material over volcanic mudflows
Slope range: 0 to 2 percent
Elevation: 10 to 100 feet
Mean annual precipitation: 45 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 7 inches—dark gray sand
7 to 10 inches—gray very fine sandy loam
10 to 60 inches—dark grayish brown loamy sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Hazard of wind erosion: Severe
High water table: Kind—apparent; depth—0.5 foot to 1.5 feet; months—November through April
Hazard of flooding: Frequency—frequent; duration—brief; months—October through May

Included Areas

• Soils that are gravelly throughout
• Soils that formed in sandy mudflows
• Soils that are well drained
• Soils that are not subject to flooding

Major Uses

Recreation, wetland wildlife habitat

Interpretive Groups

Capability subclass: 5w

19—Carrolls loamy sand, 0 to 2 percent slopes

Composition

Carrolls and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Swales, flood plains, low terraces
Parent material: Sandy dredge material over mudflows
Slope range: 0 to 2 percent
Elevation: 10 to 100 feet
Mean annual precipitation: 45 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 7 inches—dark gray loamy sand
7 to 10 inches—gray very fine sandy loam
10 to 60 inches—dark grayish brown loamy sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Hazard of wind erosion: Severe
High water table: Kind—apparent; depth—0.5 foot to 1.5 feet; months—November through April
Hazard of flooding: None

Included Areas

- Soils that are poorly drained
- Soils that are well drained
- Soils that are subject to flooding
- Soils that are gravelly or very gravelly in the upper 30 inches
- Soils that are silt loam, silty clay loam, or silty clay throughout

Major Uses

Wildlife habitat, recreation

Interpretive Groups

Capability subclass: 5w

20—Carrolls fine sandy loam, overwash, 0 to 1 percent slopes

Composition

Carrolls and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Swales, flood plains, low terraces
Parent material: Sandy tailwater deposits over mudflows
Slope range: 0 to 1 percent
Elevation: 20 to 100 feet
Mean annual precipitation: 45 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 10 inches—mottled, dark grayish brown fine sandy loam
10 to 60 inches—dark grayish brown and very dark grayish brown loamy sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Hazard of wind erosion: Severe
High water table: Kind—apparent; depth—1 foot above the surface to a depth of 1.5 feet below the surface; months—November through April
Frequency of flooding: Rare

Included Areas

- Soils that are well drained
- Soils that are silt loam in the upper 10 inches

Major Use

Wildlife habitat

Interpretive Groups

Capability subclass: 5w

21—Centralia silt loam, 0 to 8 percent slopes

Composition

Centralia and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Hillslopes, ridgetops, plateaus
Parent material: Residuum and colluvium derived from sandstone
Slope range: 0 to 8 percent
Elevation: 200 to 1,600 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

1.5 inches to 0—organic mat
0 to 10 inches—very dark grayish brown and very dark brown silt loam
10 to 41 inches—dark brown and brown clay loam
41 to 60 inches—yellowish brown loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 8 percent
- Soils that are wet
- Soils that have siltstone or sandstone fragments in the profile
- Soils that are more than 35 percent clay throughout
- Soils that are somewhat poorly drained

Major Uses

Cropland, woodland, wildlife habitat, pastureland, homesites

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, western hemlock, bigleaf maple
Major understory species: Western brackenfern, western swordfern, salal, cascade Oregongrape, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
- Grasses and legumes grow well if they are adequately fertilized.
- Supplemental irrigation is needed for crops.
- The most suitable irrigation method is a sprinkler system.
- A tillage pan forms easily if the soil is tilled when wet.
- Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Provide supplemental irrigation in years of limited precipitation.
- Irrigate at a rate that ensures optimum production but does not increase deep percolation, runoff, and erosion.
- Apply water at a slow rate over a long period to ensure that the root zone is properly wetted.
- Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
- Maintain or improve fertility by using a cropping

system that includes grasses, legumes, or grass-legume mixtures.
- Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
- Maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
- Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
- Septic tank absorption fields may function poorly because of the moderate permeability.
- If the density of housing is moderate or high, a community sewage system may be needed.

Suitable management practices:
- Use temporary sediment or debris basins to reduce the loss of soil material from construction sites.
- Preserve the existing plant cover during construction to reduce the risk of erosion.
- Prevent structural damage that results from shrinking and swelling by properly designing and building foundations, concrete structures, and paved areas.
- Increase the size of the absorption area and use additional absorption lines and sandy backfill for the trench to compensate for the moderate permeability.
- Preserve as many trees as possible.
- Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
- Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 2e

22—Centralia silt loam, 8 to 20 percent slopes

Composition

Centralia and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Hillslopes
Parent material: Residuum and colluvium derived from sandstone
Slope range: 8 to 20 percent
Elevation: 200 to 1,600 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

1.5 inches to 0—organic mat
0 to 10 inches—very dark grayish brown and very dark brown silt loam
10 to 41 inches—dark brown and brown clay loam
41 to 60 inches—yellowish brown loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 8 percent or more than 20 percent
- Soils that are wet
- Soils that are somewhat poorly drained
- Soils that have siltstone or sandstone fragments in the profile
- Soils that are more than 35 percent clay throughout

Major Uses

Cropland, woodland, wildlife habitat, pastureland, homesites

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, western hemlock, bigleaf maple
Major understory species: Western brackenfern, western swordfern, salal, cascade Oregongrape, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• A tillage pan forms if the soil is excessively cultivated.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
• Seedbeds can be prepared on the contour or across the slope where practical.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Regulate the application of irrigation water to control runoff and erosion.
• Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
• Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Maintain tilth by returning crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
• Reduce the risk of erosion by farming across the slope, planting a close-growing cover crop, seeding on the contour or across the slope, and maintaining the organic matter content.
• Maintain the quality and quantity of forage by adjusting the stocking rate, especially on the steeper slopes; rotating grazing; mowing and harrowing to spread livestock droppings; controlling weeds; and applying fertilizer annually.

Building Site Development

General management considerations:
• Septic tank absorption fields may function poorly because of the moderate permeability.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Use temporary sediment or debris basins to reduce the loss of soil material from construction sites.
• In steeper areas, reduce the risk of erosion by disturbing only the part of the site that is used for construction.
• Prevent structural damage that results from shrinking and swelling by designing foundations and footings to allow for shrinking and swelling, diverting runoff away from buildings, and backfilling with material that has low shrink-swell potential.
• Because slope is a concern in installing septic tank absorption fields, install absorption lines on the contour.
• Increase the size of the absorption area and use additional absorption lines and sandy backfill for the trench to compensate for the moderate permeability.
• Install culverts to carry seasonal runoff in areas where roads cross natural drainageways.
• Reduce the risk of erosion on steep cuts and fills by establishing plant cover.
• Preserve as many trees as possible.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 3e

23—Centralia silt loam, 20 to 30 percent slopes

Composition

Centralia and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes
Parent material: Residuum and colluvium derived from sandstone
Slope range: 20 to 30 percent
Elevation: 200 to 1,600 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

1.5 inches to 0—organic mat
0 to 10 inches—very dark grayish brown and very dark brown silt loam
10 to 41 inches—dark brown and brown clay loam
41 to 60 inches—yellowish brown loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 20 percent
- Soils that have siltstone or sandstone fragments
- Soils that are more than 35 percent clay throughout
- Soils that are wet

Major Uses

Pastureland, woodland, wildlife habitat

Pastureland

General management considerations:
- Steepness of slope is the main limitation.
- Grasses and legumes grow well if they are adequately fertilized.
- The most suitable irrigation method is a sprinkler system.
- Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Provide supplemental irrigation in years of limited precipitation.
- Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, western hemlock, bigleaf maple
Major understory species: Western brackenfern, western swordfern, salal, cascade Oregongrape, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

24—Cinebar loamy sand, overblown, 5 to 30 percent slopes

Composition

Cinebar, overblown, and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces, benches, hillslopes
Parent material: Volcanic ash over glaciofluvial deposits of volcanic ash
Slope range: 5 to 30 percent
Elevation: 1,200 to 1,800 feet
Mean annual precipitation: 60 to 75 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 150 to 200 days (28 degrees F)

Typical Profile

0 to 5 inches—dark gray loamy sand
5 to 21 inches—dark brown and very dark grayish brown silt loam
21 to 60 inches—dark yellowish brown and yellowish brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 5 percent or more than 30 percent
- Soils that are moderately well drained
- Soils that are colder
- Soils that have a loamy sand surface layer that is more than 5 inches thick
- Soils that do not have a loamy sand surface layer

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir
Minor tree species: Bigleaf maple
Major understory species: Western swordfern, cascade Oregongrape, red huckleberry, salal, vine maple, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: Deposits of volcanic ash on surface
General management considerations:
- Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

25—Cinebar silt loam, 0 to 5 percent slopes

Composition

Cinebar and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Benches, terraces
Parent material: Glaciofluvial deposits of volcanic ash

Slope range: 0 to 5 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 60 to 75 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 150 to 200 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 4 inches—dark brown silt loam
4 to 10 inches—very dark grayish brown silt loam
10 to 23 inches—brown and dark yellowish brown silt loam
23 to 60 inches—yellowish brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 5 percent
- Soils that are moderately well drained
- Soils that are more than 15 percent rock fragments throughout
- Soils that are colder
- Soils that receive a higher amount of rainfall
- Soils that have glacial till at a depth of 40 to 60 inches

Major Uses

Cropland, woodland, wildlife habitat, recreation, watershed, homesites, pastureland

Woodland

Composition

Principal tree species: Douglas fir, western hemlock, western redcedar
Minor tree species: Red alder, bigleaf maple
Major understory species: Western swordfern, cascade Oregongrape, red huckleberry, salal, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily; western hemlock—periodically
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Building Site Development

Suitable management practices:
- Preserve as many trees as possible.
- Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Pastureland and Cropland

General management considerations:
- Grasses and legumes grow well if they are adequately fertilized.
- Supplemental irrigation is needed for crops.
- The most suitable irrigation method is a sprinkler system.
- Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Provide supplemental irrigation in years of limited precipitation.
- Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
- Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
- Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
- Maintain tilth by returning crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures.
- Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock

droppings, controlling weeds, and applying fertilizer annually.

Interpretive Groups

Capability subclass: 2e

26—Cinebar silt loam, 5 to 20 percent slopes

Composition

Cinebar and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces, benches, hillslopes
Parent material: Glaciofluvial deposits of volcanic ash
Slope range: 5 to 20 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 60 to 75 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 150 to 200 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 4 inches—dark brown silt loam
4 to 10 inches—very dark grayish brown silt loam
10 to 23 inches—brown and dark yellowish brown silt loam
23 to 60 inches—yellowish brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 5 percent or more than 20 percent
- Soils that are moderately well drained
- Soils that are colder
- Soils that have receive a higher amount of rainfall
- Soils that are more than 15 percent rock fragments

Major Uses

Cropland, woodland, wildlife habitat, recreation, watershed, homesites, pastureland

Woodland

Composition

Principal tree species: Douglas fir, western hemlock, western redcedar
Minor tree species: Red alder, bigleaf maple
Major understory species: Western swordfern, cascade Oregongrape, red huckleberry, salal, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily; western hemlock—periodically
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Building Site Development

Suitable management practices:
- Because of the slope, install septic tank absorption lines on the contour.
- Install culverts to carry seasonal runoff in areas where roads cross natural drainageways.
- Stabilize disturbed areas to reduce the risk of erosion and to minimize the maintenance cost resulting from erosion.
- Seed road cuts and fills to permanent vegetation.
- Preserve as many trees as possible.
- Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.

• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Pastureland and Cropland

General management considerations:
• Steepness of slope is the main limitation.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• A tillage pan forms if the soil is excessively cultivated.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
• Seedbeds can be prepared on the contour or across the slope where practical.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Regulate the application of irrigation water to control runoff and erosion.
• If sprinklers are used, apply water slowly to minimize runoff.
• Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
• Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Maintain tilth by returning crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
• Reduce the risk of erosion by farming across the slope, planting a close-growing cover crop, seeding on the contour or across the slope, and maintaining the organic matter content.
• Maintain the quality and quantity of forage by adjusting the stocking rate, especially on the steeper slopes; rotating grazing; mowing and harrowing to spread livestock droppings; controlling weeds; and applying fertilizer annually.

Interpretive Groups

Capability subclass: 3e

27—Cinebar silt loam, 20 to 30 percent slopes

Composition

Cinebar and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces, benches, hillslopes
Parent material: Glaciofluvial deposits of volcanic ash
Slope range: 20 to 30 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 60 to 75 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 150 to 200 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 4 inches—dark brown silt loam
4 to 10 inches—very dark grayish brown silt loam
10 to 23 inches—brown and dark yellowish brown silt loam
23 to 60 inches—yellowish brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 20 percent or more than 30 percent
• Soils that are moderately well drained
• Soils that are colder
• Soils that receive a higher amount of rainfall
• Soils that are more than 15 percent rock fragments

Major Uses

Pastureland, woodland, wildlife habitat, recreation, watershed

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.

• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, western hemlock, western redcedar
Minor tree species: Red alder, bigleaf maple
Major understory species: Western swordfern, cascade Oregongrape, red huckleberry, salal, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily; western hemlock—periodically
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

28—Cinebar silt loam, 30 to 65 percent slopes

Composition

Cinebar and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes
Parent material: Glaciofluvial deposits of volcanic ash
Slope range: 30 to 65 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 60 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 150 to 200 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 4 inches—dark brown silt loam
4 to 10 inches—very dark grayish brown silt loam
10 to 23 inches—brown and dark yellowish brown silt loam
23 to 60 inches—yellowish brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent
• Soils that are colder
• Soils that receive a higher amount of rainfall
• Soils that are more than 15 percent rock fragments

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock, western redcedar
Minor tree species: Red alder, bigleaf maple

Major understory species: Western swordfern, cascade Oregongrape, red huckleberry, salal, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily; western hemlock—periodically
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

29—Cinnamon sandy loam, 5 to 30 percent slopes

Composition

Cinnamon and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountain benches and ridgetops
Parent material: Pyroclastic flows of volcanic ash and pumice
Slope range: 5 to 30 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 100 to 135 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 125 to 175 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 3 inches—very dark brown sandy loam
3 to 22 inches—dark brown and brown sandy loam
22 to 38 inches—dark yellowish brown sandy loam
38 to 60 inches—yellowish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 30 percent
• Soils that are more than 35 percent rock fragments throughout

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Western redcedar, red alder
Major understory species: Vine maple, salal, red huckleberry, cascade Oregongrape, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

• Use a brush blade for site preparation to reduce the risk of soil displacement.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock—periodically
Restrictions to planting: None
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

30—Cinnamon sandy loam, 30 to 65 percent slopes

Composition

Cinnamon and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes
Parent material: Pyroclastic flows of volcanic ash and pumice
Slope range: 30 to 65 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 100 to 135 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 125 to 175 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 3 inches—very dark brown sandy loam
3 to 22 inches—dark brown and brown sandy loam
22 to 38 inches—dark yellowish brown sandy loam
38 to 60 inches—yellowish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are more than 35 percent rock fragments throughout
• Soils that are wet

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Western redcedar, red alder
Major understory species: Vine maple, salal, red huckleberry, cascade Oregongrape, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps;

energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—periodically
Restrictions to planting: None
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

31—Cinnamon sandy loam, 65 to 90 percent slopes

Composition

Cinnamon and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes
Parent material: Pyroclastic flows of volcanic ash and pumice
Slope range: 65 to 90 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 100 to 135 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 125 to 175 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 3 inches—very dark brown sandy loam
3 to 22 inches—dark brown and brown sandy loam
22 to 38 inches—dark yellowish brown sandy loam
38 to 60 inches—yellowish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 65 percent
• Soils that are more than 35 percent rock fragments throughout

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Western redcedar, red alder
Major understory species: Vine maple, salal, red huckleberry, cascade Oregongrape, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they

require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—periodically
Restrictions to planting: None
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

32—Clato silt loam, 0 to 3 percent slopes

Composition

Clato and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Flood plains
Parent material: Mixed alluvium
Slope range: 0 to 3 percent
Elevation: 30 to 300 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 215 to 240 days (28 degrees F)

Typical Profile

0 to 11 inches—dark yellowish brown silt loam
11 to 80 inches—dark brown and dark yellowish brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Frequency of flooding: Rare

Included Areas

• Soils that are wet
• Soils that are subject to flooding
• Soils that have a sandy subsoil

Major Uses

Cropland, pastureland, woodland

Cropland and Pastureland

General management considerations:
• Most climatically adapted crops can be grown.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
• Increase the water intake rate by growing cover crops, returning crop residue to the soil, and rotating crops.
• Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures, rotating crops, and growing cover crops.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Maintain tilth by returning crop residue to the soil, using a cropping system that includes grasses, legumes, or grass-legume mixtures, rotating crops, and growing cover crops.
• Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, black cottonwood
Minor tree species: Red alder, bigleaf maple
Major understory species: Western brackenfern, western swordfern, salal, cascade Oregongrape, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and good water quality (fig. 3).

Interpretive Groups

Capability class: 1

33—Coweeman silt loam, 5 to 15 percent slopes

Composition

Coweeman and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Stream terraces
Parent material: Old alluvium
Slope range: 5 to 15 percent
Elevation: 250 to 700 feet
Mean annual precipitation: 45 to 65 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 7 inches—dark grayish brown silt loam
7 to 14 inches—mottled, light brownish gray silty clay loam
14 to 70 inches—mottled, light brownish gray, light olive gray, greenish gray, and gray clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—1 to 2 feet; months—December through March
Hazard of flooding: None

Included Areas

• Soils that are well drained
• Soils that are moderately well drained
• Soils that have slopes of more than 15 percent
• Soils that have a silty clay loam surface layer

Major Uses

Woodland, wildlife habitat, pastureland

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Bigleaf maple, western redcedar
Major understory species: Salal, vine maple, western brackenfern, cascade Oregongrape, western hazel

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland

General management considerations:
• A seasonal high water table is the main limitation for pasture grasses.

Figure 3.—Natural vegetation used as wildlife habitat in an area of Clato silt loam, 0 to 3 percent slopes.

- Grasses and legumes grow well if they are adequately fertilized.
- The most suitable irrigation method is a sprinkler system.
- Wetness limits the choice of plants, the period of grazing, and the production of deep-rooted crops.
- A tillage pan forms easily if the soil is tilled when wet.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:

- Either select plants that tolerate wetness or maintain drainage.
- Provide irrigation and maintain drainage if management is intensive.
- Maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.

• Reduce the risk of erosion by farming across the slope, fertilizing, and maintaining the organic matter content.
• Maintain the quality and quantity of forage by adjusting the stocking rate, especially on the steeper slopes; rotating grazing; mowing and harrowing to spread livestock droppings; controlling weeds; and applying fertilizer annually.

Interpretive Groups

Capability subclass: 4w

34—Coweeman silty clay loam, 3 to 30 percent slopes

Composition

Coweeman and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Stream terraces, ridges
Parent material: Old alluvium
Slope range: 3 to 30 percent
Elevation: 250 to 700 feet
Mean annual precipitation: 45 to 65 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 7 inches—dark grayish brown silty clay loam
7 to 14 inches—mottled, light brownish gray silty clay loam
14 to 70 inches—mottled, light brownish gray, light olive gray, greenish gray, and gray clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—1 to 2 feet; months—December through March
Hazard of flooding: None

Included Areas

• Soils that are well drained
• Soils that are moderately well drained
• Soils that have a silt loam surface layer

Major Uses

Woodland, wildlife habitat, pastureland

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Bigleaf maple, western redcedar
Major understory species: Salal, vine maple, western brackenfern, cascade Oregongrape, western hazel

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland

General management considerations:
• A seasonal high water table is the main limitation for pasture grasses.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Wetness limits the choice of plants, the period of grazing, and the production of deep-rooted crops.
• A tillage pan forms easily if the soil is tilled when wet.

• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Either select plants that tolerate wetness or maintain drainage.
• Provide irrigation and maintain drainage if management is intensive.
• Maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Reduce the risk of erosion by farming across the slope, fertilizing, and maintaining the organic matter content.
• Maintain the quality and quantity of forage by adjusting the stocking rate, especially on the steeper slopes; rotating grazing; mowing and harrowing to spread livestock droppings; controlling weeds; and applying fertilizer annually.

Interpretive Groups

Capability subclass: 4e

35—Cowlitz very gravelly sand, 0 to 1 percent slopes

Composition

Cowlitz and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Flood plains
Parent material: Gravelly debris flow
Slope range: 0 to 1 percent
Elevation: 10 to 200 feet
Mean annual precipitation: 60 to 80 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 175 to 200 days (28 degrees F)

Typical Profile

0 to 10 inches—dark gray very gravelly sand
10 to 60 inches—dark gray extremely gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Hazard of wind erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: Frequency—occasional; duration—brief; months—November through April

Included Areas

• Soils that are poorly drained
• Soils that are somewhat poorly drained
• Soils that are subject to frequent flooding
• Soils that are not subject to flooding

Major Uses

Wildlife habitat, recreation

Interpretive Groups

Capability subclass: 4s

36—Cowlitz extremely gravelly sand, disturbed, 0 to 5 percent slopes

Composition

Cowlitz and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Terraces
Parent material: Gravelly dredge material over mudflows
Slope range: 0 to 5 percent
Elevation: 10 to 200 feet
Mean annual precipitation: 45 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 11 inches—dark gray extremely gravelly sand
11 to 60 inches—dark gray very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 5 percent
• Soils that are wet
• Soils that have less than 35 percent rock fragments throughout

- Soils that are compacted
- Soils that are not underlain by mudflows

Major Use

Wildlife habitat

Interpretive Groups

Capability subclass: 6s

37—Cowlitz extremely gravelly sand, disturbed, 5 to 15 percent slopes

Composition

Cowlitz and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Terraces
Parent material: Gravelly dredge material over mudflows
Slope range: 5 to 15 percent
Elevation: 10 to 200 feet
Mean annual precipitation: 45 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 11 inches—dark gray extremely gravelly sand
11 to 60 inches—dark gray very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 5 percent or more than 15 percent
- Soils that have less than 35 percent rock fragments throughout
- Soils that are compacted

Major Use

Wildlife habitat

Interpretive Groups

Capability subclass: 6s

38—Cowlitz extremely gravelly sand, disturbed, 15 to 30 percent slopes

Composition

Cowlitz and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Terraces
Parent material: Gravelly dredge material over mudflows
Slope range: 15 to 30 percent
Elevation: 10 to 200 feet
Mean annual precipitation: 45 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 11 inches—dark gray extremely gravelly sand
11 to 60 inches—dark gray very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 15 percent or more than 30 percent
- Soils that have less than 35 percent rock fragments in the profile
- Soils that are compacted

Major Use

Wildlife habitat

Interpretive Groups

Capability subclass: 6s

39—Delameter extremely gravelly loamy sand, 0 to 20 percent slopes

Composition

Delameter and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Highly irregularly dissected valley floors
Parent material: Avalanche debris flow
Slope range: 0 to 20 percent
Elevation: 1,200 to 2,700 feet
Mean annual precipitation: 90 to 110 inches
Mean annual air temperature: 40 to 45 degrees F
Growing season: 125 to 175 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through March

Typical Profile

0 to 10 inches—dark gray extremely gravelly loamy sand
10 to 60 inches—dark gray extremely gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 20 percent
- Soils that are wet
- Soils that are extremely gravelly throughout with fragments that are dominantly cinders
- Soils that are very fine sandy loam throughout
- Soils that have an extremely gravelly surface layer with fragments that are dominantly cinders
- Soils that have a stony or bouldery surface layer
- Soils that are subject to flooding

Major Uses

Recreation, wildlife habitat

Interpretive Groups

Capability subclass: 6s

40—Dobbs gravelly silt loam, 5 to 30 percent slopes

Composition

Dobbs and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, alpine glacial valleys, cirque basins
Parent material: Glacial till derived from andesitic colluvium with a mantle of volcanic ash and pumiceous cinders overlying dense till
Slope range: 5 to 30 percent
Elevation: 2,000 to 3,200 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 41 to 44 degrees F
Growing season: 160 to 180 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through May

Typical Profile

4 inches to 0—organic mat
0 to 14 inches—very dark brown and dark brown gravelly silt loam
14 to 26 inches—brown very gravelly sandy loam
26 to 35 inches—brown very gravelly sandy loam
35 to 45 inches—brown dense glacial till

Soil Properties and Qualities

Depth class: Moderately deep to dense glacial till that restricts roots and movement of air and water
Drainage class: Moderately well drained
Permeability: Moderate in the upper 35 inches
Available water capacity: Moderate
Potential rooting depth: 30 to 40 inches
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—2.5 to 3.0 feet; months—November through March
Hazard of flooding: None

Included Areas

- Soils that are wet
- Soils that are well drained
- Soils that have slopes of more than 30 percent
- Soils that have glacial till at a depth of less than 35 inches

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Pacific silver fir, noble fir
Major understory species: Vine maple, cascade Oregongrape, trailing blackberry, western swordfern, salal

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock—readily; Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

41—Dobbs gravelly silt loam, 30 to 65 percent slopes

Composition

Dobbs and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, alpine glacial valleys
Parent material: Glacial till derived from andesite with a mantle of volcanic ash and pumiceous cinders overlying dense till
Slope range: 30 to 65 percent
Elevation: 2,000 to 3,200 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 41 to 44 degrees F
Growing season: 160 to 180 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through May

Typical Profile

4 inches to 0—organic mat
0 to 14 inches—very dark brown and dark brown gravelly silt loam
14 to 26 inches—brown very gravelly sandy loam
26 to 35 inches—brown very gravelly sandy loam
35 to 45 inches—brown dense glacial till

Soil Properties and Qualities

Depth class: Moderately deep to dense glacial till that restricts roots and movement of air and water
Drainage class: Moderately well drained
Permeability: Moderate in the upper 35 inches
Available water capacity: Moderate
Potential rooting depth: 30 to 40 inches
Runoff: Medium
Hazard of water erosion: Moderate
Seasonal high water table: Kind—perched; depth—2.5 to 3.0 feet; months—November through March
Hazard of flooding: None

Included Areas

- Soils that are wet
- Soils that are well drained
- Soils that have slopes of less than 30 percent
- Soils that have glacial till at a depth of less than 35 inches

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Pacific silver fir, noble fir
Major understory species: Vine maple, cascade Oregongrape, trailing blackberry, western swordfern, salal

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—readily; Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

42—Domell loamy sand, overblown, 5 to 30 percent slopes

Composition

Domell, overblown, and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Benches, mountainslopes, ridgetops
Parent material: Volcanic ash over lahar or mudflow material with a high content of volcanic ash and pumiceous cinders
Slope range: 5 to 30 percent
Elevation: 1,800 to 2,600 feet
Mean annual precipitation: 70 to 80 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 160 to 180 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

0 to 5 inches—dark gray loamy sand
5 to 13 inches—very dark brown sandy loam
13 to 19 inches—very dark grayish brown fine sandy loam
19 to 39 inches—dark yellowish brown fine sandy loam
39 to 50 inches—dark yellowish brown and pale brown loam
50 to 60 inches—yellowish brown and grayish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 30 percent
• Soils that are more than 35 percent rock fragments
• Soils that are colder
• Soils that have stones on the surface
• Soils that have a loamy sand surface layer that is more than 5 inches thick
• Soils that do not have a loamy sand surface layer
• Soils that are wet

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir
Minor tree species: Bigleaf maple
Major understory species: Western swordfern, salal, cascade Oregongrape, red huckleberry, Oregon oxalis, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—periodically
Restriction to planting: Deposits of volcanic ash on surface
General management considerations:
- Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

43—Domell sandy loam, 5 to 30 percent slopes

Composition

Domell and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Benches, mountainslopes, ridgetops
Parent material: Lahar or mudflow material with a high content of volcanic ash and pumiceous cinders
Slope range: 5 to 30 percent
Elevation: 1,800 to 2,600 feet
Mean annual precipitation: 70 to 80 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 160 to 180 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 8 inches—very dark brown sandy loam
8 to 23 inches—very dark grayish brown and dark yellowish brown loam and sandy loam
23 to 60 inches—dark yellowish brown, yellowish brown, pale brown, and grayish brown loam and sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 30 percent
- Soils that are more than 35 percent rock fragments
- Soils that are colder
- Soils that have stones on the surface
- Soils that have glacial till in the substratum
- Soils that are wet

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, bigleaf maple
Major understory species: Western swordfern, salal, cascade Oregongrape, red huckleberry, Oregon oxalis

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder and western hemlock—periodically
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

44—Domell sandy loam, 30 to 70 percent slopes

Composition

Domell and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes
Parent material: Lahar or mudflow material with a high content of volcanic ash and pumiceous cinders
Slope range: 30 to 70 percent
Elevation: 1,800 to 2,600 feet
Mean annual precipitation: 70 to 80 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 160 to 180 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 8 inches—very dark brown sandy loam
8 to 23 inches—very dark grayish brown and dark yellowish brown loam and sandy loam
23 to 60 inches—dark yellowish brown, yellowish brown, pale brown, and grayish brown loam and sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent
• Soils that are more than 35 percent rock fragments
• Soils that are colder
• Soils that have stones on the surface
• Soils that have glacial till in the substratum

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, bigleaf maple
Major understory species: Western swordfern, salal, cascade Oregongrape, red huckleberry, Oregon oxalis

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road

grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder and western hemlock—periodically
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

45—Domell stony sandy loam, 5 to 30 percent slopes

Composition

Domell and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Benches, mountainslopes, ridgetops
Parent material: Lahar or mudflow material with a high content of volcanic ash and pumiceous cinders
Slope range: 5 to 30 percent
Elevation: 1,800 to 2,600 feet
Mean annual precipitation: 70 to 80 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 160 to 180 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 12 inches—very dark brown stony sandy loam
12 to 23 inches—dark yellowish brown sandy loam
23 to 60 inches—dark yellowish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 30 percent
- Soils that have less than 35 percent rock fragments
- Soils that are colder
- Soils that do not have stones on the surface
- Soils that have glacial till in the substratum
- Soils that are wet

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Western swordfern, salal, cascade Oregongrape, red huckleberry, Oregon oxalis

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder and western hemlock—periodically
Restriction to planting: Stones in the soil
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

46—Domell stony sandy loam, 30 to 65 percent slopes

Composition

Domell and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes
Parent material: Lahar or mudflow material with a high content of volcanic ash and pumiceous cinders
Slope range: 30 to 65 percent
Elevation: 1,800 to 2,600 feet
Mean annual precipitation: 70 to 80 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 160 to 180 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 12 inches—very dark brown stony sandy loam
12 to 23 inches—dark yellowish brown sandy loam
23 to 60 inches—dark yellowish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are less than 35 percent rock fragments
• Soils that are colder
• Soils that do not have stones on the surface
• Soils that have glacial till in the substratum

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Western swordfern, salal, cascade Oregongrape, red huckleberry, Oregon oxalis

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder and western hemlock—periodically
Restriction to planting: Stones in the soil
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.

• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

47—Edgewick silt loam, 0 to 3 percent slopes

Composition

Edgewick and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Flood plains
Parent material: Alluvium
Slope range: 0 to 3 percent
Elevation: 50 to 300 feet
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 150 to 225 days (28 degrees F)

Typical Profile

0 to 4 inches—dark brown silt loam
4 to 25 inches—dark brown loam
25 to 32 inches—brown sandy loam
32 to 60 inches—brown very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid in the upper 32 inches and very rapid below this depth
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: Frequency—occasional; duration—brief; months—November through March

Included Areas

• Soils that are wet
• Soils that are moderately well drained or somewhat excessively drained
• Soils that do not have gravel
• Soils that are not subject to flooding
• Soils that are silt loam or loam throughout
• Soils that have a cobbly loam or gravelly loam surface layer

Major Uses

Cropland, woodland, pastureland

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar
Major understory species: Trailing blackberry, salmonberry, cascade Oregongrape, vine maple, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
• Seasonal flooding is the main limitation.
• Most climatically adapted crops can be grown.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
• Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures, rotating crops, and growing cover crops.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.

• Maintain tilth by returning crop residue to the soil; using a cropping system that includes grasses, legumes, or grass-legume mixtures; rotating crops; and growing cover crops.
• Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Interpretive Groups

Capability subclass: 3w

48—Elkprairie loamy sand, 0 to 30 percent slopes

Composition

Elkprairie and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Terraces, hillslopes
Parent material: Volcanic ash, pumice
Slope range: 0 to 30 percent
Elevation: 2,600 to 4,700 feet
Mean annual precipitation: 120 to 135 inches
Mean annual air temperature: 38 to 42 degrees F
Growing season: 75 to 95 days (28 degrees F)
Periods of snowpack: November through June

Typical Profile

0 to 6 inches—dark gray loamy sand
6 to 17 inches—dark gray gravelly sand and gravelly coarse sand
17 to 23 inches—very dark gray very gravelly sand
23 to 36 inches—very dark brown, brown, and reddish yellow gravelly loam and fine sandy loam
36 to 60 inches—yellowish brown loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that are poorly drained
• Soils that are somewhat poorly drained
• Soils that are somewhat excessively drained
• Soils that have a gravelly surface layer with fragments that are dominantly cinders

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Lodgepole pine
Minor tree species: None
Major understory species: Scattered shrubs and grasses

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil displacement, use designated skid trails and low-pressure ground equipment, schedule operations for periods when the soil is moist, minimize tractor churning on dry soil, and use a brush blade during site preparation.
• Equipment commonly is inoperable because of the snowpack.

Roads, trails, and landings

• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: None
Restrictions to planting: Volcanic ash deposits, snowpack
General management considerations:
• The mortality rate of planted tree seedlings is very high because of the relatively deep, nutrient-deficient, droughty deposits of volcanic ash. If possible, plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material. In areas that have deep deposits of volcanic ash, planting drought-tolerant tree species, providing

artificial shade, and applying nutrient amendments may help to improve the survival of planted tree seedlings.

Interpretive Groups

Capability subclass: 6e

49—Elochoman silt loam, 5 to 30 percent slopes

Composition

Elochoman and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Hillslopes, mountainslopes
Parent material: Residuum derived from sandstone
Slope range: 5 to 30 percent
Elevation: 400 to 1,700 feet
Mean annual precipitation: 70 to 120 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 12 inches—very dark grayish brown and dark brown silt loam
12 to 26 inches—dark yellowish brown silt loam
26 to 60 inches—yellowish brown loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that are more than 35 percent soft sandstone or siltstone fragments throughout
• Soils that are more than 15 percent hard rock fragments in the upper part of the profile

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir
Minor tree species: Red alder, western redcedar, Sitka spruce, bigleaf maple
Major understory species: Western swordfern, salmonberry, salal, vine maple, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

50—Ferteg silt loam, 0 to 8 percent slopes

Composition

Ferteg and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Benches, terraces

Parent material: Alluvial and eolian deposits of volcanic ash overlying dense glaciofluvial deposits
Slope range: 0 to 8 percent
Elevation: 700 to 1,700 feet
Mean annual precipitation: 60 to 65 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 6 inches—dark brown silt loam
6 to 25 inches—dark yellowish brown and brown silt loam
25 to 34 inches—mottled, brown silty clay loam
34 to 60 inches—mottled, yellowish brown silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate in the upper 34 inches and slow below this depth
Available water capacity: High
Potential rooting depth: 30 to 42 inches
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—2.5 to 3.5 inches; months—December through March
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 8 percent
- Soils that are well drained
- Soils that are more than 15 percent rock fragments throughout

Major Uses

Pastureland, woodland, wildlife habitat, recreation, watershed

Pastureland

General management considerations:
- Grasses and legumes grow well if they are adequately fertilized.
- The most suitable irrigation method is a sprinkler system.
- Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Provide supplemental irrigation in years of limited precipitation.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, vine maple, salmonberry, western swordfern, red huckleberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 2e

51—Ferteg silt loam, 8 to 30 percent slopes

Composition

Ferteg and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Terraces, hillslopes
Parent material: Alluvial and eolian deposits of volcanic ash overlying dense glaciofluvial deposits

Slope range: 8 to 30 percent
Elevation: 700 to 1,700 feet
Mean annual precipitation: 60 to 65 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 6 inches—dark brown silt loam
6 to 25 inches—dark yellowish brown and brown silt loam
25 to 34 inches—mottled, brown silty clay loam
34 to 60 inches—mottled, yellowish brown silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate in the upper 34 inches and slow below this depth
Available water capacity: High
Potential rooting depth: 30 to 42 inches
Runoff: Medium
Hazard of water erosion: Moderate
Seasonal high water table: Kind—perched; depth—2.5 to 3.5 inches; months—December through March
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 8 percent or more than 30 percent
• Soils that are well drained
• Soils that are more than 15 percent rock fragments throughout

Major Uses

Pastureland, woodland, wildlife habitat, recreation, watershed

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, vine maple, salmonberry, western swordfern, red huckleberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

52—Forsyth very cobbly loamy sand, 0 to 30 percent slopes

Composition

Forsyth and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Fans, terraces
Parent material: Pyroclastic flow and lahar material with an admixture of aerially deposited volcanic ash and pumice
Slope range: 0 to 30 percent
Elevation: 1,600 to 2,800 feet
Mean annual precipitation: 110 to 130 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 120 to 140 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 7 inches—very dark gray and dark brown very cobbly loamy sand
7 to 17 inches—very dark grayish brown extremely cobbly sand
17 to 32 inches—very dark gray very gravelly sand
32 to 60 inches—dark gray extremely cobbly sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 30 percent
- Soils that have stones or boulders on the surface
- Soils that do not have gravel
- Soils that are ashy throughout

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Western white pine, lodgepole pine, Pacific silver fir
Major understory species: Sitka alder, kinnikinnick, salal, red huckleberry, prince's pine

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil displacement, use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock, western white pine, lodgepole pine, and Pacific silver fir—periodically
Restriction to planting: Cobbles in the soil
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6s

53—Forsyth very cobbly loamy sand, 50 to 90 percent slopes

Composition

Forsyth and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terrace escarpments
Parent material: Pyroclastic flow and lahar material with an admixture of aerially deposited volcanic ash and pumice
Slope range: 50 to 90 percent
Elevation: 1,600 to 2,800 feet
Mean annual precipitation: 110 to 130 inches
Mean annual air temperature: 42 to 44 degrees F

Growing season: 120 to 140 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 7 inches—very dark gray and dark brown very cobbly loamy sand
7 to 17 inches—very dark grayish brown extremely cobbly sand
17 to 32 inches—very dark gray very gravelly sand
32 to 60 inches—dark gray extremely cobbly sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 50 percent
- Soils that have stones or boulders on the surface
- Soils that do not have gravel
- Soils that are ashy throughout

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Western white pine, lodgepole pine, Pacific silver fir
Major understory species: Sitka alder, kinnikinnick, salal, red huckleberry, prince's pine

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil displacement and erosion can be minimized by using appropriate cable yarding systems.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock, western white pine, lodgepole pine, and Pacific silver fir—periodically
Restriction to planting: Cobbles in the soil
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

54—Germany silt loam, 0 to 8 percent slopes

Composition

Germany and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Plateaus, hillslopes
Parent material: Residuum and colluvium derived from basalt with a mantle of loess and volcanic ash
Slope range: 0 to 8 percent
Elevation: 200 to 1,400 feet
Mean annual precipitation: 50 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 22 inches—very dark brown and dark brown silt loam

22 to 49 inches—brown silt loam
49 to 72 inches—brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 8 percent
- Soils that are more than 15 percent rock fragments throughout
- Soils that are wet

Major Uses

Woodland, pastureland, cropland, homesites, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Western swordfern, western brackenfern, salal, salmonberry, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
- Most climatically adapted crops can be grown.
- Supplemental irrigation is needed for crops.
- The most suitable irrigation method is a sprinkler system.
- A tillage pan forms easily if the soil is tilled when wet.
- Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Provide supplemental irrigation in years of limited precipitation.
- Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
- Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
- Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
- Maintain tilth by returning crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures.
- Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
- Septic tank absorption fields may function poorly because of the moderate permeability, which restricts the movement and filtration of effluent.
- If the density of housing is moderate or high, a community sewage system may be needed.

Suitable management practices:
- Increase the size of the absorption area and use additional absorption lines and sandy backfill for the trench to compensate for the moderate permeability.
- Provide roads for year-round use with heavy base rock.
- Provide an adequate wearing surface on roads to

minimize the amount of dust and the maintenance cost.
• Install culverts to carry seasonal runoff where roads cross natural drainageways.
• Preserve as many trees as possible.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 2e

55—Germany silt loam, 8 to 20 percent slopes

Composition

Germany and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Ridgetops, hillslopes
Parent material: Residuum and colluvium derived from basalt with a mantle of loess and volcanic ash
Slope range: 8 to 20 percent
Elevation: 200 to 1,400 feet
Mean annual precipitation: 50 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 22 inches—very dark brown and dark brown silt loam
22 to 49 inches—brown silt loam
49 to 72 inches—brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 8 percent or more than 20 percent
• Soils that are more than 15 percent rock fragments throughout
• Soils that are wet

Major Uses

Cropland, woodland, pastureland, wildlife habitat, homesites

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Western swordfern, western brackenfern, salal, salmonberry, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
• Steepness of slope is the main limitation.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• A tillage pan forms easily if the soil is tilled when wet.
• Most crops respond to nitrogen, phosphorus, and

potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Irrigate at a rate that ensures optimum production but does not increase deep percolation, runoff, and erosion.
• Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Reduce the risk of erosion by fertilizing and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by adjusting the stocking rate, especially on the steeper slopes; rotating grazing; mowing and harrowing to spread livestock droppings; controlling weeds; and applying fertilizer annually.

Building Site Development

General management considerations:
• Steepness of slope is the main limitation.
• Septic tank absorption fields may function poorly because of the moderate permeability, which restricts the movement and filtration of the effluent.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Use temporary sediment or debris basins to reduce the loss of soil material from construction sites.
• Increase the size of the absorption area and use additional absorption lines and sandy backfill for the trench to compensate for the moderate permeability.
• Because slope is a concern in installing septic tank absorption fields, install absorption lines on the contour.
• Provide roads for year-round use with heavy base rock.
• Provide an adequate wearing surface on roads to minimize the amount of dust and the maintenance cost.
• Install culverts to carry seasonal runoff where roads cross natural drainageways.
• Reduce the risk of erosion on steep cuts and fills by establishing a plant cover.
• Preserve as many trees as possible.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 3e

56—Germany silt loam, 20 to 30 percent slopes

Composition

Germany and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Ridgetops, hillslopes
Parent material: Residuum and colluvium derived from basalt with a mantle of loess and volcanic ash
Slope range: 20 to 30 percent
Elevation: 200 to 1,400 feet
Mean annual precipitation: 50 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 22 inches—very dark brown and dark brown silt loam
22 to 49 inches—brown silt loam
49 to 72 inches—brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 20 percent or more than 30 percent
• Soils that are more than 15 percent rock fragments throughout

Major Uses

Pastureland, woodland, wildlife habitat

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of

the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Western swordfern, western brackenfern, salal, salmonberry, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

57—Germany silt loam, 30 to 65 percent slopes

Composition

Germany and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes
Parent material: Residuum and colluvium derived from basalt with a mantle of loess and volcanic ash
Slope range: 30 to 65 percent
Elevation: 200 to 1,400 feet
Mean annual precipitation: 50 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 22 inches—very dark brown and dark brown silt loam
22 to 49 inches—brown silt loam
49 to 72 inches—brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent
• Soils that are more than 15 percent rock fragments throughout

Major Uses

Woodland, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Western swordfern, western brackenfern, salal, salmonberry, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked

equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

58—Germany silt loam, tuff substratum, 8 to 20 percent slopes

Composition

Germany and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Benches, hillslopes
Parent material: Residuum and colluvium derived from basalt with a mantle of volcanic ash and loess
Slope range: 8 to 20 percent
Elevation: 700 to 1,400 feet
Mean annual precipitation: 60 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 22 inches—very dark brown and dark brown silt loam
22 to 49 inches—dark brown silt loam
49 to 59 inches—weathered tuffaceous material

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 20 percent
• Soils that formed in weathered basalt
• Soils that are wet
• Soils that are more than 15 percent rock fragments throughout

Major Uses

Pastureland, woodland, wildlife habitat, recreation

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, western hemlock

Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Western swordfern, western brackenfern, salal, salmonberry, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 3e

59—Germany silt loam, tuff substratum, 20 to 30 percent slopes

Composition

Germany and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Ridgetops, hillslopes
Parent material: Residuum and colluvium derived from basalt with a mantle of volcanic ash and loess
Slope range: 20 to 30 percent
Elevation: 700 to 1,400 feet
Mean annual precipitation: 60 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 22 inches—very dark brown and dark brown silt loam
22 to 49 inches—dark brown silt loam
49 to 59 inches—weathered tuffaceous material

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 20 percent or more than 30 percent
• Soils that formed in weathered basalt
• Soils that are more than 15 percent rock fragments throughout
• Soils that are wet

Major Uses

Pastureland, woodland, wildlife habitat, recreation

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread

livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Western swordfern, western brackenfern, salal, salmonberry, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

60—Germany silt loam, tuff substratum, 30 to 65 percent slopes

Composition

Germany and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Ridgetops, hillslopes
Parent material: Residuum and colluvium derived from pyroclastic breccia, tuff breccia, and tuff with a mantle of volcanic ash and loess
Slope range: 30 to 65 percent
Elevation: 700 to 1,400 feet
Mean annual precipitation: 60 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 22 inches—very dark brown and dark brown silt loam
22 to 49 inches—dark brown silt loam
49 to 59 inches—weathered tuffaceous material

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent
• Soils that formed in weathered basalt
• Soils that are more than 15 percent rock fragments throughout

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Western swordfern, western brackenfern, salal, salmonberry, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

61—Gobar silt loam, 5 to 30 percent slopes

Composition

Gobar and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Benches, hillslopes, mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from tuff and tuffaceous breccia with a mantle of volcanic ash and loess
Slope range: 5 to 30 percent
Elevation: 500 to 1,800 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 175 to 200 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 10 inches—very dark grayish brown and dark brown silt loam
10 to 46 inches—dark yellowish brown and yellowish brown silt loam
46 to 56 inches—multicolored, highly weathered and fractured tuff

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 30 percent
• Soils that are less than 35 percent soft fragments throughout
• Soils that are colder
• Soils that are gravelly throughout

Major Uses

Pastureland, woodland, wildlife habitat, watershed, recreation

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread

livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Vine maple, salal, cascade Oregongrape, red huckleberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

62—Gobar silt loam, 30 to 65 percent slopes

Composition

Gobar and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes, mountainslopes
Parent material: Residuum and colluvium derived from tuff and tuffaceous breccia with a mantle of volcanic ash and loess
Slope range: 30 to 65 percent
Elevation: 500 to 1,800 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 175 to 200 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 10 inches—very dark grayish brown and dark brown silt loam
10 to 46 inches—dark yellowish brown and yellowish brown silt loam
46 to 56 inches—multicolored, highly weathered and fractured tuff

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are less than 35 percent soft fragments throughout
• Soils that are colder
• Soils that are gravelly throughout

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Vine maple, salal, cascade Oregongrape, red huckleberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil

damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

63—Gobar silt loam, 65 to 90 percent slopes

Composition

Gobar and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes, mountainslopes
Parent material: Residuum and colluvium derived from tuff and tuffaceous breccia with a mantle of volcanic ash and loess
Slope range: 65 to 90 percent
Elevation: 500 to 1,800 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 175 to 200 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 10 inches—very dark grayish brown and dark brown silt loam
10 to 46 inches—dark yellowish brown and yellowish brown silt loam
46 to 56 inches—multicolored, highly weathered and fractured tuff

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Very rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 65 percent
• Soils that are less than 35 percent soft fragments throughout
• Soils that are colder
• Soils that are gravelly throughout

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Vine maple, salal, cascade Oregongrape, red huckleberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

64—Gobar silt loam, 5 to 45 percent slopes, dissected

Composition

Gobar and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Benches, hillslopes, mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from tuff and tuffaceous breccia with a mantle of volcanic ash and loess
Slope range: 5 to 45 percent
Elevation: 500 to 1,800 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 175 to 200 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 10 inches—very dark grayish brown and dark brown silt loam
10 to 46 inches—dark yellowish brown and yellowish brown silt loam
46 to 56 inches—multicolored, highly weathered and fractured tuff

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 45 percent
• Soils that are less than 35 percent soft fragments throughout
• Soils that are colder
• Soils that are gravelly throughout

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Vine maple, salal, cascade Oregongrape, red huckleberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion on slopes of more than 30 percent; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.
• The slopes are highly dissected by small drainageways; therefore, cable yarding systems can be used to minimize soil damage.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as

road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

65—Godfrey silt loam, 0 to 3 percent slopes

Composition

Godfrey and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Depressions on flood plains
Parent material: Mixed alluvium
Slope range: 0 to 3 percent
Elevation: 20 to 300 feet
Mean annual precipitation: 40 to 65 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 215 to 240 days (28 degrees F)

Typical Profile

0 to 5 inches—dark gray silt loam
5 to 27 inches—mottled, gray silty clay loam
27 to 33 inches—mottled, dark gray sandy clay
33 to 60 inches—mottled, dark gray clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—apparent; depth—at the surface to a depth of 2 feet below the surface; months—November through March
Frequency of flooding: Occasional

Included Areas

• Soils that are artificially drained
• Soils that have a silty clay loam surface layer

Major Uses

Pastureland, woodland, wildlife habitat

Pastureland

General management considerations:
• The seasonal high water table is the main limitation for pasture grasses.
• Most climatically adapted crops can be grown if adequate drainage is maintained and protection from flooding is provided.
• Shallow-rooted, water-tolerant plants can be grown.
• Grasses and legumes grow well if they are adequately fertilized.
• Wetness limits the choice of plants, the period of grazing, and the production of deep-rooted crops.
• Maintaining drainage is difficult because of the lack of suitable outlets.
• A tillage pan forms easily if the soil is tilled when wet.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Either select plants that tolerate wetness or maintain drainage.
• Seed only the hay and pasture plants that tolerate periodic inundation and seasonal wetness.
• Maintain tile drains to reduce wetness if a suitable outlet is available.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, applying fertilizer annually, and maintaining drainage.

Woodland

Composition

Principal tree species: Red alder
Minor tree species: Black cottonwood, western redcedar, bigleaf maple
Major understory species: Vine maple, willow, Douglas spirea, sedges, rushes

Harvesting practices

Suitability of logging systems: Wheeled and tracked

equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: High water table
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 5w

66—Greenwater loamy sand, 8 to 45 percent slopes

Composition

Greenwater and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Terraces, terrace escarpments
Parent material: Mixed alluvium, pumice
Slope range: 8 to 45 percent
Elevation: 100 to 700 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

5 inches to 0—organic mat
0 to 8 inches—dark brown loamy sand
8 to 22 inches—brown fine sand
22 to 60 inches—very dark grayish brown and dark grayish brown fine sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Frequency of flooding: Rare

Included Areas

• Soils that are more than 15 percent rock fragments throughout
• Soils that are well drained or moderately well drained
• Soils that have slopes of less than 8 percent or more than 45 percent

Major Uses

Pastureland, watershed, wildlife habitat, woodland

Pastureland

General management considerations:
• Grasses and legumes grow well if they are adequately fertilized.
• The low available water capacity is the main limitation.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, bigleaf maple, western redcedar
Major understory species: Salal, cascade Oregongrape, vine maple, creambush oceanspray, evergreen blackberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion on slopes of more than 30 percent; cable yarding systems—suitable

Equipment use

• Soil displacement and erosion can be minimized by

using appropriate cable yarding systems on slopes of more than 30 percent.
• Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation activities to minimize soil displacement on slopes of less than 30 percent.

Roads, trails, and landings

• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

67—Greenwater loamy sand, overblown, 0 to 8 percent slopes

Composition

Greenwater, overblown, and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Terraces
Parent material: Mixed alluvium and pumice with a mantle of aerially deposited volcanic ash
Slope range: 0 to 8 percent
Elevation: 100 to 700 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 8 inches—dark brown loamy sand
8 to 22 inches—brown fine sand
22 to 60 inches—very dark grayish brown and dark grayish brown fine sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that are more than 15 percent rock fragments throughout
• Soils that are well drained or moderately well drained
• Soils that have slopes of more than 8 percent

Major Uses

Watershed, wildlife habitat, woodland

Woodland

Composition

Principal tree species: Douglas fir
Minor tree species: Bigleaf maple
Major understory species: Salal, cascade Oregongrape, vine maple, creambush oceanspray, evergreen blackberry, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: Deposits of volcanic ash on surface
General management considerations:
• Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot

scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 3s

68—Greenwater gravelly loamy sand, 0 to 8 percent slopes

Composition

Greenwater and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Terraces
Parent material: Mixed alluvium, pumice
Slope range: 0 to 8 percent
Elevation: 100 to 700 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days

Typical Profile

5 inches to 0—organic mat
0 to 8 inches—dark brown gravelly loamy sand
8 to 19 inches—brown fine sand
19 to 60 inches—very dark grayish brown and dark grayish brown fine sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Frequency of flooding: Rare

Included Areas

• Soils that have slopes of more than 8 percent
• Soils that have less than 15 percent rock fragments throughout
• Soils that are well drained or moderately well drained
• Soils that have a compact subsoil at a depth of 20 to 40 inches

Major Uses

Woodland, pastureland, homesites, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, bigleaf maple, western redcedar
Major understory species: Salal, cascade Oregongrape, vine maple, creambush oceanspray, evergreen blackberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To reduce the risk of soil displacement, use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade for site preparation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland

General management considerations:
• The low available water capacity is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• Because the soil is droughty, light and frequent applications of irrigation water are essential.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.

• Irrigate at a rate that ensures optimum production but does not increase deep percolation, runoff, and erosion.
• Apply enough water to wet the root zone but not so much that it leaches plant nutrients.
• Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
• Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Maintain tilth by returning crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
• Onsite sewage disposal systems may not be suitable because of the risk of polluting the ground water.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Stockpile topsoil and use it to reclaim areas disturbed during construction.
• Construct special retainer walls in shallow excavations to prevent cutbanks from caving in.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 3s

69—Greenwater fine sandy loam, 0 to 8 percent slopes

Composition

Greenwater and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Terraces
Parent material: Mixed alluvium, pumice
Slope range: 0 to 8 percent
Elevation: 100 to 700 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

5 inches to 0—organic mat
0 to 8 inches—dark brown fine sandy loam
8 to 22 inches—brown fine sand
22 to 60 inches—very dark grayish brown and dark grayish brown fine sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Frequency of flooding: Rare

Included Areas

• Soils that are more than 15 percent rock fragments throughout
• Soils that are well drained or moderately well drained
• Soils that have slopes of more than 8 percent
• Soils that have a compact subsoil at a depth of 20 to 40 inches

Major Uses

Woodland, pastureland, wildlife habitat, homesites

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, bigleaf maple, western redcedar
Major understory species: Salal, cascade Oregongrape, vine maple, creambush oceanspray, evergreen blackberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland

General management considerations:
• The low available water capacity is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• Because the soil is droughty, light and frequent applications of irrigation water are essential.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Irrigate at a rate that ensures optimum production but does not increase deep percolation, runoff, and erosion.
• Apply enough water to wet the root zone but not so much that it leaches plant nutrients.
• Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
• Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Maintain tilth by returning crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
• Onsite sewage disposal systems may not be suitable because of the risk of polluting the ground water.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Stockpile topsoil and use it to reclaim areas disturbed during construction.
• Construct special retainer walls in shallow excavations to prevent cutbanks from caving in.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 3s

70—Hatchet loamy sand, overblown, 30 to 65 percent slopes

Composition

Hatchet, overblown, and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite with a mantle of volcanic ash and pumice
Slope range: 30 to 65 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 120 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through May

Typical Profile

0 to 5 inches—dark gray loamy sand
5 to 23 inches—dark brown and brown extremely cobbly loam
23 to 38 inches—dark yellowish brown and yellowish brown extremely cobbly sandy loam
38 inches—fractured andesite

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low

Potential rooting depth: 20 to 40 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that have bedrock at a depth of 40 inches or more
• Soils that have a loamy sand surface layer that is more than 5 inches thick
• Soils that do not have a loamy sand surface layer

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Common beargrass, deerfern, starflower, prince's pine, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil displacement and erosion can be minimized by using appropriate cable yarding systems.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restrictions to planting: Cobbles in the soil, deposits of volcanic ash on surface
General management considerations:
• Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

71—Hatchet loamy sand, overblown, 65 to 90 percent slopes

Composition

Hatchet, overblown, and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite with a mantle of volcanic ash and pumice
Slope range: 65 to 90 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 120 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through May

Typical Profile

0 to 5 inches—dark gray loamy sand
5 to 23 inches—dark brown and brown extremely cobbly loam
23 to 38 inches—dark yellowish brown and yellowish brown extremely cobbly sandy loam
38 inches—fractured andesite

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low

Potential rooting depth: 20 to 40 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that have bedrock at a depth of 40 inches or more
- Soils that have a loamy sand surface layer that is more than 5 inches thick
- Soils that do not have a loamy sand surface layer

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Common beargrass, deerfern, starflower, prince's pine, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil displacement and erosion can be minimized by using appropriate cable yarding systems.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restrictions to planting: Cobbles in the soil, deposits of volcanic ash on surface
General management considerations:

- Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

72—Hatchet very cobbly sandy loam, 30 to 65 percent slopes

Composition

Hatchet and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite with a mantle of volcanic ash and pumice
Slope range: 30 to 65 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 120 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through May

Typical Profile

4 inches to 0—organic mat
0 to 11 inches—dark brown very cobbly sandy loam
11 to 21 inches—dark brown extremely cobbly loam
21 to 36 inches—dark yellowish brown and yellowish brown extremely cobbly sandy loam
36 inches—fractured andesite

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate

Available water capacity: Low
Potential rooting depth: 20 to 40 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 30 percent or more than 65 percent
- Soils that have bedrock at a depth of 40 inches or more

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western white pine
Major understory species: Common beargrass, deerfern, starflower, prince's pine

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil displacement and erosion can be minimized by using appropriate cable yarding systems.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restriction to planting: Cobbles in the soil
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

73—Hatchet-Rock outcrop complex, 30 to 65 percent slopes

Composition

Hatchet and similar soils—65 percent
Rock outcrop—20 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite with a mantle of volcanic ash and pumice
Slope range: 30 to 65 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 120 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through May

Hatchet

Typical profile

4 inches to 0—organic mat
0 to 11 inches—dark brown very cobbly sandy loam
11 to 21 inches—dark brown extremely cobbly loam
21 to 36 inches—dark yellowish brown and yellowish brown extremely cobbly sandy loam
36 inches—fractured andesite

Soil properties and qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 20 to 40 inches

Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that have bedrock at a depth of 40 inches or more
• Soils that have bedrock at a depth of less than 20 inches

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western white pine
Major understory species: Common beargrass, deerfern, starflower, prince's pine

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil displacement and erosion can be minimized by using appropriate cable yarding systems.
• Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil displacement and erosion.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: Cobbles in the soil, Rock outcrop
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Hatchet—7e; Rock outcrop—8s

74—Hatchet-Rock outcrop complex, 65 to 90 percent slopes

Composition

Hatchet and similar soils—65 percent
Rock outcrop—20 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite with a mantle of volcanic ash and pumice
Slope range: 65 to 90 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 120 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through May

Hatchet

Typical profile

4 inches to 0—organic mat
0 to 11 inches—dark brown very cobbly sandy loam
11 to 21 inches—dark brown extremely cobbly loam
21 to 36 inches—dark yellowish brown and yellowish brown extremely cobbly sandy loam
36 inches—fractured andesite

Soil properties and qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 20 to 40 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that have bedrock at a depth of 40 inches or more
- Soils that have bedrock at a depth of less than 20 inches

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western white pine
Major understory species: Common beargrass, deerfern, starflower, prince's pine

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil displacement and erosion can be minimized by using appropriate cable yarding systems.
- Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil displacement and erosion.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: Cobbles in the soil, Rock outcrop
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Hatchet—7e; Rock outcrop—8s

75—Hatchet, overblown-Rock outcrop complex, 65 to 90 percent slopes

Composition

Hatchet, overblown, and similar soils—65 percent
Rock outcrop—20 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite with a mantle of volcanic ash and pumice
Slope range: 65 to 90 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 120 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through May

Hatchet, Overblown

Typical profile

0 to 5 inches—dark gray loamy sand
5 to 23 inches—dark brown and brown extremely cobbly loam

23 to 38 inches—dark yellowish brown and yellowish brown extremely cobbly sandy loam
38 inches—fractured andesite

Soil properties and qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 20 to 40 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that have bedrock at a depth of 40 inches or more
- Soils that have bedrock at a depth of less than 20 inches
- Soils that have a loamy sand surface layer more than 5 inches thick
- Soils that do not have a loamy sand surface layer

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Common beargrass, deerfern, starflower, prince's pine, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil displacement and erosion can be minimized by using appropriate cable yarding systems.
- Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil displacement and erosion.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restrictions to planting: Cobbles in the soil, Rock outcrop, deposits of volcanic ash on surface
General management considerations:
- Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Hatchet, overblown—7e; Rock outcrop—8s

76—Hazeldell gravelly silt loam, 8 to 20 percent slopes

Composition

Hazeldell and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes
Parent material: Residuum and colluvium derived from basalt

Slope range: 8 to 20 percent
Elevation: 200 to 1,800 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 7 inches—dark brown gravelly silt loam
7 to 28 inches—dark brown and brown gravelly clay loam
28 to 40 inches—brown very gravelly clay loam
40 to 60 inches—yellowish red very gravelly clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 8 percent or more than 20 percent
- Soils that are more than 35 percent clay throughout

Major Uses

Cropland, woodland, recreation, wildlife habitat, watershed, pastureland

Pastureland

General management considerations:
- Steepness of slope is the main limitation.
- Grasses and legumes grow well if they are adequately fertilized.
- The most suitable irrigation method is a sprinkler system.
- Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Provide supplemental irrigation in years of limited precipitation.
- Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
- Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Salal, cascade Oregongrape, western brackenfern, western swordfern, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 3e

77—Hazeldell gravelly silt loam, 20 to 30 percent slopes

Composition

Hazeldell and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes
Parent material: Residuum and colluvium derived from basalt
Slope range: 20 to 30 percent
Elevation: 200 to 1,800 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 7 inches—dark brown gravelly silt loam
7 to 28 inches—dark brown and brown gravelly clay loam
28 to 40 inches—brown very gravelly clay loam
40 to 60 inches—yellowish red very gravelly clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 20 percent or more than 30 percent
• Soils that are more than 35 percent clay throughout

Major Uses

Woodland, recreation, wildlife habitat, watershed, pastureland

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Salal, cascade Oregongrape, western brackenfern, western swordfern, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

78—Hazeldell gravelly silt loam, 30 to 65 percent slopes

Composition

Hazeldell and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes
Parent material: Residuum and colluvium derived from basalt
Slope range: 30 to 65 percent
Elevation: 200 to 1,800 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 7 inches—dark brown gravelly silt loam
7 to 28 inches—dark brown and brown gravelly clay loam
28 to 40 inches—brown very gravelly clay loam
40 to 60 inches—yellowish red very gravelly clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 30 percent
- Soils that are more than 35 percent clay throughout
- Soils that are wet

Major Uses

Woodland, recreation, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Salal, cascade Oregongrape, western brackenfern, western swordfern, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

79—Hazeldell gravelly silt loam, tuff substratum, 5 to 30 percent slopes

Composition

Hazeldell and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes
Parent material: Residuum and colluvium derived from basalt underlain by tuff
Slope range: 5 to 30 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 50 to 70 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat

0 to 7 inches—dark brown gravelly silt loam
7 to 28 inches—dark brown and brown gravelly clay loam
28 to 40 inches—brown very gravelly clay loam
40 to 50 inches—yellowish red very gravelly clay loam
50 to 60 inches—weathered tuffaceous material

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 50 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 30 percent
• Soils that are more than 35 percent clay throughout

Major Uses

Woodland, recreation, wildlife habitat, watershed, pastureland

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Salal, cascade Oregongrape, western brackenfern, western swordfern, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

80—Hazeldell gravelly silt loam, tuff substratum, 30 to 65 percent slopes

Composition

Hazeldell and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes
Parent material: Residuum and colluvium derived from basalt underlain by tuff
Slope range: 30 to 65 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 50 to 70 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 7 inches—dark brown gravelly silt loam
7 to 28 inches—dark brown and brown gravelly clay loam
28 to 40 inches—brown very gravelly clay loam
40 to 50 inches—yellowish red very gravelly clay loam
50 to 60 inches—weathered tuffaceous material

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 50 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 30 percent
- Soils that are more than 35 percent clay throughout

Major Uses

Woodland, recreation, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Salal, cascade Oregongrape, western brackenfern, western swordfern, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

81—Histic Cryaquepts, 0 to 1 percent slopes

Composition

Histic Cryaquepts and similar soils—90 percent
Contrasting soils—10 percent

Setting

Position on landscape: Basins of mountain valleys and cirques
Parent material: Layers of peat, muck, pumice, and volcanic ash
Slope range: 0 to 1 percent
Elevation: 2,800 to 4,000 feet
Mean annual precipitation: 100 to 130 inches
Mean annual air temperature: 37 to 39 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through May

Reference Profile

0 to 13 inches—very dark brown muck
13 to 21 inches—very dark gray loamy sand
21 to 31 inches—gray sandy loam
31 to 35 inches—very dark brown muck
35 to 60 inches—very dark brown gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Very poorly drained or poorly drained
Permeability: Moderate to a depth of about 35 inches and very rapid below this depth
Available water capacity: High

Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—apparent; depth—at the surface to a depth of 2 feet below the surface; months—November through July
Hazard of flooding: None

Included Areas

- Soils that are well drained, moderately well drained, or ponded

Major Uses

Recreation, wildlife habitat

Interpretive Groups

Capability subclass: 6w

82—Histic Humaquepts, 0 to 3 percent slopes

Composition

Histic Humaquepts and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Basins
Parent material: Layers of muck and volcanic ash underlain by lahar
Slope range: 0 to 3 percent
Elevation: 1,000 to 1,200 feet
Mean annual precipitation: 70 to 100 inches
Mean annual air temperature: 47 to 49 degrees F
Growing season: 150 to 200 days (28 degrees F)

Reference Profile

0 to 8 inches—very dark brown muck
8 to 20 inches—dark gray loam, gravelly loam, or gravelly sandy loam
20 to 80 inches—lahar that breaks to sandy loam to sand and may be gravelly to extremely gravelly

Soil Properties and Qualities

Depth class: Moderately deep to very deep
Drainage class: Poorly drained or very poorly drained
Permeability: Moderately rapid
Available water capacity: Moderate
Potential rooting depth: 20 to 80 inches
Runoff: Ponded
Hazard of water erosion: None
Seasonal high water table: Kind—apparent; depth—1 foot above the surface to a depth of 1 foot below the surface; months—November through April
Hazard of flooding: None

Included Areas

- Soils that are well drained
- Soils that are organic throughout
- Soils that have lahar at a depth of less than 20 inches or more than 80 inches

Major Use

Wetland wildlife habitat

Interpretive Groups

Capability subclass: 5w

83—Hoffstadt loamy sand, overblown, 5 to 30 percent slopes

Composition

Hoffstadt, overblown, and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Benches, mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from basalt with a mantle of volcanic ash
Slope range: 5 to 30 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 150 to 180 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—December through April

Typical Profile

0 to 5 inches—dark gray loamy sand
5 to 9 inches—very dark grayish brown very gravelly sandy loam
9 to 15 inches—brown very gravelly sandy loam
15 to 23 inches—brown very cobbly sandy loam
23 to 52 inches—brown extremely cobbly sandy loam
52 inches—hard olivine basalt

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 30 percent
- Soils that are very deep
- Soils that are more than 25 percent pumice throughout
- Soils that have a surface layer of loamy sand more than 5 inches thick
- Soils that do not have a loamy sand surface layer

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir
Minor tree species: Bigleaf maple
Major understory species: Cascade Oregongrape, salal, western swordfern, trailing blackberry, red huckleberry, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation to reduce soil displacement.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: None
Restrictions to planting: Cobbles in the soil, deposits of volcanic ash on surface
General management considerations:
- Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

84—Hoffstadt loamy sand, overblown, 30 to 70 percent slopes

Composition

Hoffstadt, overblown, and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from basalt with a mantle of volcanic ash
Slope range: 30 to 70 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 150 to 180 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—December through April

Typical Profile

0 to 5 inches—dark gray loamy sand
5 to 9 inches—very dark grayish brown very gravelly sandy loam
9 to 15 inches—brown very gravelly sandy loam
15 to 23 inches—brown very cobbly sandy loam
23 to 52 inches—brown extremely cobbly sandy loam
52 inches—hard olivine basalt

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 30 percent or more than 70 percent
- Soils that are very deep
- Soils that are more than 25 percent pumice throughout
- Soils that have a loamy sand surface layer more than 5 inches thick
- Soils that do not have a loamy sand surface layer

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir
Minor tree species: Bigleaf maple
Major understory species: Cascade Oregongrape, salal, western swordfern, trailing blackberry, red huckleberry, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil displacement and erosion can be minimized by using appropriate cable yarding systems.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restrictions to planting: Cobbles in the soil, deposits of volcanic ash on surface

General management considerations:

- Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

85—Hoffstadt very gravelly sandy loam, 5 to 30 percent slopes

Composition

Hoffstadt and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from basalt with an admixture of volcanic ash
Slope range: 5 to 30 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 150 to 180 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—December through April

Typical Profile

2 inches to 0—organic mat
0 to 4 inches—very dark grayish brown very gravelly sandy loam
4 to 10 inches—dark yellowish brown very gravelly sandy loam
10 to 19 inches—dark yellowish brown very cobbly sandy loam
19 to 47 inches—brown extremely cobbly sandy loam
47 inches—hard olivine basalt

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 40 to 60 inches

Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 30 percent
- Soils that are very deep
- Soils that are more than 25 percent pumice throughout
- Soils that have a loamy sand surface layer

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Cascade Oregongrape, salal, western swordfern, trailing blackberry, red huckleberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation to reduce soil displacement.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock—readily
Restriction to planting: Cobbles in the soil
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

86—Hoffstadt very gravelly sandy loam, 30 to 65 percent slopes

Composition

Hoffstadt and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from basalt with an admixture of volcanic ash
Slope range: 30 to 65 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 150 to 180 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—December through April

Typical Profile

2 inches to 0—organic mat
0 to 4 inches—very dark grayish brown very gravelly sandy loam
4 to 10 inches—dark yellowish brown very gravelly sandy loam
10 to 19 inches—dark yellowish brown very cobbly sandy loam
19 to 47 inches—brown extremely stony sandy loam
47 inches—hard olivine basalt

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 30 percent or more than 65 percent

- Soils that are very deep
- Soils that are more than 25 percent pumice throughout
- Soils that have a loamy sand surface layer

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Cascade Oregongrape, salal, western swordfern, trailing blackberry, red huckleberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil displacement and erosion can be minimized by using appropriate cable yarding systems.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—readily
Restriction to planting: Cobbles in the soil
General management considerations:

- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

87—Hoffstadt-Rock outcrop complex, 30 to 65 percent slopes

Composition

Hoffstadt and similar soils—65 percent
Rock outcrop—20 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from basalt with an admixture of volcanic ash
Slope range: 30 to 65 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 150 to 180 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—December through April

Hoffstadt

Typical profile

2 inches to 0—organic mat
0 to 4 inches—very dark grayish brown very gravelly sandy loam
4 to 10 inches—dark yellowish brown very gravelly sandy loam
10 to 19 inches—dark yellowish brown very cobbly sandy loam
19 to 47 inches—brown extremely stony sandy loam
47 inches—hard olivine basalt

Soil properties and qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of basalt or andesite

Included Areas

- Soils that have slopes of less than 30 percent or more than 65 percent
- Soils that are very deep
- Soils that have bedrock at a depth of less than 40 inches
- Soils that are more than 25 percent pumice throughout
- Soils that have a loamy sand surface layer

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Cascade Oregongrape, salal, western swordfern, trailing blackberry, red huckleberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil displacement and erosion can be minimized by using appropriate cable yarding systems.
- Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil displacement and erosion.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—readily
Restrictions to planting: Cobbles in the soil, Rock outcrop
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Hoffstadt—7e; Rock outcrop—8s

88—Hoffstadt-Rock outcrop complex, 65 to 90 percent slopes

Composition

Hoffstadt and similar soils—65 percent
Rock outcrop—20 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from basalt with an admixture of volcanic ash
Slope range: 65 to 90 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 150 to 180 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—December through April

Hoffstadt

Typical profile

2 inches to 0—organic mat
0 to 4 inches—very dark grayish brown very gravelly sandy loam
4 to 10 inches—dark yellowish brown very gravelly sandy loam
10 to 19 inches—dark yellowish brown very cobbly sandy loam
19 to 47 inches—brown extremely stony sandy loam
47 inches—hard olivine basalt

Soil properties and qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 40 to 60 inches

Runoff: Very rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of basalt or andesite

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that are very deep
- Soils that have bedrock at a depth of less than 40 inches
- Soils that are more than 25 percent pumice throughout
- Soils that have a loamy sand surface layer

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Cascade Oregongrape, salal, western swordfern, trailing blackberry, red huckleberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil displacement and erosion can be minimized by using appropriate cable yarding systems.
- Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil displacement and erosion.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—readily
Restrictions to planting: Cobbles in the soil, Rock outcrop
General management considerations:

- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Hoffstadt—7e; Rock outcrop—8s

89—Hoffstadt, overblown-Rock outcrop complex, 30 to 65 percent slopes

Composition

Hoffstadt, overblown, and similar soils—65 percent
Rock outcrop—20 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from basalt with a mantle of volcanic ash
Slope range: 30 to 65 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 150 to 180 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—December through April

Hoffstadt, Overblown

Typical profile

0 to 5 inches—dark gray loamy sand
5 to 9 inches—very dark grayish brown very gravelly sandy loam
9 to 15 inches—dark yellowish brown very gravelly sandy loam
15 to 23 inches—dark yellowish brown very cobbly sandy loam
23 to 52 inches—brown extremely stony sandy loam
52 inches—hard olivine basalt

Soil properties and qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of basalt or andesite

Included Areas

- Soils that have slopes of less than 30 percent or more than 65 percent
- Soils that are very deep
- Soils that are more than 25 percent pumice throughout
- Soils that have a loamy sand surface layer more than 5 inches thick
- Soils that do not have a loamy sand surface layer
- Soils that have bedrock at a depth of less than 40 inches

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir
Minor tree species: Bigleaf maple
Major understory species: Cascade Oregongrape, salal, western swordfern, trailing blackberry, red huckleberry, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil displacement and erosion can be minimized by using appropriate cable yarding systems.
- Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil displacement and erosion.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restrictions to planting: Cobbles in the soil, Rock outcrop, deposits of volcanic ash on surface
General management considerations:
- Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Hoffstadt, overblown—7e; Rock outcrop—8s

90—Hoffstadt, overblown-Rock outcrop complex, 65 to 90 percent slopes

Composition

Hoffstadt, overblown, and similar soils—65 percent
Rock outcrop—20 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from basalt with a mantle of volcanic ash

Slope range: 65 to 90 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 150 to 180 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—December through April

Hoffstadt, Overblown

Typical profile

0 to 5 inches—dark gray loamy sand
5 to 9 inches—very dark grayish brown very gravelly sandy loam
9 to 15 inches—dark yellowish brown very gravelly sandy loam
15 to 23 inches—dark yellowish brown very cobbly sandy loam
23 to 52 inches—brown extremely stony sandy loam
52 inches—hard olivine basalt

Soil properties and qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 40 to 60 inches
Runoff: Very rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of basalt or andesite

Included Areas

• Soils that have slopes of less than 65 percent
• Soils that are very deep
• Soils that are more than 25 percent pumice throughout
• Soils that have a loamy sand surface layer more than 5 inches thick
• Soils that do not have a loamy sand surface layer
• Soils that have bedrock at a depth of less than 40 inches

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir
Minor tree species: Bigleaf maple
Major understory species: Cascade Oregongrape, salal, western swordfern, trailing blackberry, red huckleberry, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil displacement and erosion can be minimized by using appropriate cable yarding systems.
• Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil displacement and erosion.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restrictions to planting: Cobbles in the soil, Rock outcrop, deposits of volcanic ash on surface
General management considerations:
• Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Hoffstadt, overblown—7e; Rock outcrop—8s

91—Jonas silt loam, 5 to 30 percent slopes

Composition

Jonas and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Benches, hillslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite and andesitic volcanic breccia with a mantle of volcanic ash
Slope range: 5 to 30 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 60 to 90 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 140 to 190 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 8 inches—very dark brown silt loam
8 to 18 inches—dark brown very gravelly silt loam
18 to 29 inches—dark yellowish brown gravelly clay loam
29 to 46 inches—dark yellowish brown cobbly clay loam
46 to 60 inches—dark yellowish brown cobbly clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that are 35 to 85 percent pebbles and cobbles
• Soils that are less than 15 percent pebbles and cobbles
• Soils that are less than 60 inches deep to bedrock

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Western brackenfern, vine maple, cascade Oregongrape, western swordfern, salal

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

92—Jonas silt loam, 30 to 65 percent slopes

Composition

Jonas and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite and andesitic volcanic breccia with a mantle of volcanic ash
Slope range: 30 to 65 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 60 to 90 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 140 to 190 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 8 inches—very dark brown silt loam
8 to 18 inches—dark brown very gravelly silt loam
18 to 29 inches—dark yellowish brown gravelly clay loam
29 to 46 inches—dark yellowish brown cobbly clay loam
46 to 60 inches—dark yellowish brown cobbly clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are 35 to 85 percent pebbles and cobbles
• Soils that are less than 15 percent pebbles and cobbles
• Soils that are less than 60 inches deep to bedrock

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Western brackenfern, vine maple, cascade Oregongrape, western swordfern, salal

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

93—Kalama gravelly loam, 8 to 15 percent slopes

Composition

Kalama and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: High terraces
Parent material: Old gravelly alluvium
Slope range: 8 to 15 percent
Elevation: 100 to 500 feet
Mean annual precipitation: 45 to 60 inches
Mean annual air temperature: 51 to 53 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 7 inches—very dark brown gravelly loam
7 to 17 inches—brown gravelly loam
17 to 21 inches—mottled, brown gravelly clay loam
21 to 31 inches—brown gravelly clay loam
31 to 60 inches—brownish yellow very gravelly clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—2.5 to 5.0 feet; months—December through March
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 8 percent or more than 15 percent
• Soils that are somewhat poorly drained
• Soils that are poorly drained
• Soils that are well drained
• Soils that are more than 35 percent clay throughout
• Soils that are less than 15 percent fine sand or coarser material

Major Uses

Cropland, woodland, pastureland, homesites

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Salal, western brackenfern, cascade Oregongrape, cascara buckthorn, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Reduce the risk of erosion by fertilizing and by seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
• Septic tank absorption fields may function poorly because of wetness late in winter and in spring.
Suitable management practices:
• Reduce wetness by providing drainage around buildings with basements and crawl spaces, installing drain tile around footings, and providing drainage if roads and building foundations are to be constructed.
• Preserve the existing plant cover during construction to reduce the risk of erosion.
• Because slope is a concern in installing septic tank absorption fields, install absorption lines on the contour.
• Increase the size of the absorption area to compensate for the moderately slow permeability.
• Seed road cuts and fills to permanent vegetation.
• Preserve as many trees as possible.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 3e

94—Kalama gravelly loam, 15 to 30 percent slopes

Composition

Kalama and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: High terraces, terrace escarpments
Parent material: Old gravelly alluvium
Slope range: 15 to 30 percent
Elevation: 100 to 500 feet
Mean annual precipitation: 45 to 60 inches
Mean annual air temperature: 51 to 53 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 7 inches—very dark brown gravelly loam
7 to 17 inches—brown gravelly loam
17 to 21 inches—mottled, brown gravelly clay loam
21 to 31 inches—brown gravelly clay loam
31 to 60 inches—brownish yellow very gravelly clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—2.5 to 5.0 feet; months—December through March
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 15 percent or more than 30 percent
• Soils that are somewhat poorly drained
• Soils that are poorly drained
• Soils that are well drained
• Soils that are more than 35 percent clay throughout
• Soils that are less than 15 percent fine sand or coarser material

Major Uses

Woodland, pastureland

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Salal, western brackenfern, cascade Oregongrape, cascara buckthorn, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as

road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Interpretive Groups

Capability subclass: 4e

95—Kalama gravelly loam, 30 to 60 percent slopes

Composition

Kalama and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terrace escarpments
Parent material: Old gravelly alluvium
Slope range: 30 to 60 percent
Elevation: 100 to 500 feet
Mean annual precipitation: 45 to 60 inches
Mean annual air temperature: 51 to 53 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 7 inches—very dark brown gravelly loam
7 to 17 inches—brown gravelly loam
17 to 21 inches—mottled, brown gravelly clay loam
21 to 31 inches—brown gravelly clay loam
31 to 60 inches—brownish yellow very gravelly clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Seasonal high water table: Kind—perched; depth—2.5 to 5.0 feet; months—December through March
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent
• Soils that are somewhat poorly drained
• Soils that are well drained
• Soils that are more than 35 percent clay throughout
• Soils that are less than 15 percent fine sand or coarser material

Major Uses

Woodland, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Salal, western brackenfern, cascade Oregongrape, cascara buckthorn, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

96—Katula very cobbly loam, 30 to 65 percent slopes

Composition

Katula and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Weathered basalt
Slope range: 30 to 65 percent
Elevation: 700 to 1,800 feet
Mean annual precipitation: 70 to 110 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 180 to 220 days (28 degrees F)

Typical Profile

4 inches to 0—organic mat
0 to 5 inches—dark reddish brown very cobbly loam
5 to 15 inches—dark reddish brown very cobbly loam
15 to 30 inches—brown extremely cobbly clay loam
30 inches—fractured basalt

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 20 to 40 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are more than 40 inches deep to bedrock
• Soils that are less than 20 inches deep to bedrock
• Soils that do not have gravel
• Soils that are at an elevation of more than 1,800 feet

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, bigleaf maple, noble fir, Pacific silver fir
Major understory species: Cascade Oregongrape, vine maple, salal, western swordfern, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily; western hemlock—periodically
Restriction to planting: Cobbles in the soil
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

97—Katula very cobbly loam, 65 to 90 percent slopes

Composition

Katula and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Weathered basalt
Slope range: 65 to 90 percent
Elevation: 700 to 1,800 feet
Mean annual precipitation: 70 to 110 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 180 to 220 days (28 degrees F)

Typical Profile

4 inches to 0—organic mat
0 to 5 inches—dark reddish brown very cobbly loam
5 to 15 inches—dark reddish brown very cobbly loam
15 to 30 inches—brown extremely cobbly clay loam
30 inches—fractured basalt

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 20 to 40 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 65 percent
• Soils that are more than 40 inches deep to bedrock
• Soils that are less than 20 inches deep to bedrock
• Soils that do not have gravel
• Soils that are at an elevation of more than 1,800 feet

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, bigleaf maple, noble fir, Pacific silver fir
Major understory species: Cascade Oregongrape, vine maple, salal, western swordfern, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily; western hemlock—periodically
Restriction to planting: Cobbles in the soil

General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

98—Katula-Bunker complex, 30 to 65 percent slopes

Composition

Katula and similar soils—60 percent
Bunker and similar soils—30 percent
Contrasting soils—10 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Katula soil—weathered basalt; Bunker soil—colluvium derived from basalt and volcanic breccia
Slope range: 30 to 65 percent
Elevation: 700 to 1,800 feet
Mean annual precipitation: 70 to 110 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 180 to 220 days (28 degrees F)

Typical Profile

Katula

4 inches to 0—organic mat
0 to 5 inches—dark reddish brown very cobbly loam
5 to 15 inches—dark reddish brown very cobbly loam
15 to 30 inches—brown extremely cobbly clay loam
30 inches—fractured basalt

Bunker

2 inches to 0—organic mat
0 to 12 inches—dark brown silt loam
12 to 27 inches—brown gravelly clay loam
27 to 42 inches—brown loam
42 inches—fractured basalt

Soil Properties and Qualities

Depth class: Katula—moderately deep; Bunker—deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Katula—low; Bunker—high
Potential rooting depth: Katula—20 to 40 inches; Bunker—40 to 60 inches
Runoff: Katula—medium; Bunker—rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are less than 20 inches or more than 60 inches deep to bedrock
• Soils that do not have gravel
• Soils that are at an elevation of more than 1,800 feet

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Katula—red alder, bigleaf maple, noble fir, Pacific silver fir; Bunker—red alder, western redcedar, bigleaf maple
Major understory species: Katula—cascade Oregongrape, vine maple, salal, western swordfern, western brackenfern; Bunker—western swordfern, cascade Oregongrape, salal, red huckleberry, salmonberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the

risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration (Katula): Red alder—readily; western hemlock—periodically
Potential for natural regeneration (Bunker): Western hemlock and red alder—readily
Restrictions to planting: Katula—cobbles in the soil; Bunker—none
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

99—Katula-Bunker complex, 65 to 90 percent slopes

Composition

Katula and similar soils—60 percent
Bunker and similar soils—30 percent
Contrasting components—10 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Katula—weathered basalt; Bunker—colluvium derived from basalt and volcanic breccia
Slope range: 65 to 90 percent
Elevation: 700 to 1,800 feet
Mean annual precipitation: 70 to 110 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 180 to 220 days (28 degrees F)

Typical Profile

Katula

4 inches to 0—organic mat
0 to 5 inches—dark reddish brown very cobbly loam
5 to 15 inches—dark reddish brown very cobbly loam
15 to 30 inches—brown extremely cobbly clay loam
30 inches—fractured basalt

Bunker

2 inches to 0—organic mat
0 to 12 inches—dark brown silt loam
12 to 27 inches—brown gravelly clay loam
27 to 42 inches—brown loam
42 inches—fractured basalt

Soil Properties and Qualities

Depth class: Katula—moderately deep; Bunker—deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Katula—low; Bunker—high
Potential rooting depth: Katula—20 to 40 inches; Bunker—40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 65 percent
• Soils that are less than 20 inches or more than 60 inches deep to bedrock
• Soils that do not have gravel
• Soils that are at an elevation of more than 1,800 feet
• Rock outcrop

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Katula—red alder, bigleaf maple, noble fir, Pacific silver fir; Bunker—red alder, western redcedar, bigleaf maple
Major understory species: Katula—cascade Oregongrape, vine maple, salal, western swordfern, western brackenfern; Bunker—western swordfern, cascade Oregongrape, salal, red huckleberry, salmonberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road

grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration (Katula): Red alder—readily; western hemlock—periodically
Potential for natural regeneration (Bunker): Western hemlock and red alder—readily
Restrictions to planting: Katula—cobbles in the soil; Bunker—none
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

100—Kelso silt loam, 0 to 8 percent slopes

Composition

Kelso and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces
Parent material: Old alluvium
Slope range: 0 to 8 percent
Elevation: 50 to 200 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 11 inches—very dark grayish brown silt loam
11 to 18 inches—dark yellowish brown silt loam
18 to 34 inches—mottled, dark yellowish brown and yellowish brown silty clay loam
34 to 45 inches—mottled, yellowish brown and grayish brown silty clay loam and silt loam
45 to 60 inches—mottled, dark yellowish brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—2 to 3 feet; months—December through March
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 8 percent
• Soils that are somewhat poorly drained
• Soils that are poorly drained
• Soils that are well drained

Major Uses

Cropland, woodland, pastureland, homesites

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, bigleaf maple
Major understory species: Western brackenfern, western swordfern, salal, elderberry, western hazel

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
• The seasonal high water table is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Wetness limits the choice of plants, the period of grazing, and the production of deep-rooted crops.
• A tillage pan forms easily if the soil is tilled when wet.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide irrigation and maintain drainage if management is intensive.
• Provide supplemental irrigation in years of limited precipitation.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
• Septic tank absorption fields may function poorly because of the seasonal wetness and slow permeability, which restrict the movement and filtration of the effluent.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Reduce wetness by providing drainage around buildings with basements and crawl spaces, installing drain tile around footings, and providing drainage if roads and building foundations are to be constructed.
• Prevent structural damage that results from shrinking and swelling by properly designing and building foundations, concrete structures, and paved areas and by backfilling with material that has low shrink-swell potential.
• Increase the size of the absorption area and use additional absorption lines and sandy backfill for the trench to compensate for the slow permeability.
• Stabilize disturbed areas to reduce the risk of erosion and to minimize the maintenance cost resulting from erosion.
• Seed road cuts and fills to permanent vegetation.
• Preserve as many trees as possible.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.
• Provide drainage for best results with most lawn grasses, shade trees, ornamental trees, shrubs, and vegetable gardens.

Interpretive Groups

Capability subclass: 2e

101—Kelso silt loam, 8 to 15 percent slopes

Composition

Kelso and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces
Parent material: Old alluvium
Slope range: 8 to 15 percent
Elevation: 50 to 200 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 11 inches—very dark grayish brown silt loam
11 to 18 inches—dark yellowish brown silt loam
18 to 34 inches—mottled, dark yellowish brown and yellowish brown silty clay loam
34 to 45 inches—mottled, yellowish brown and grayish brown silty clay loam and silt loam
45 to 60 inches—mottled, dark yellowish brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—2 to 3 feet; months—December through March
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 8 percent or more than 15 percent
• Soils that are somewhat poorly drained
• Soils that are poorly drained
• Soils that are well drained

Major Uses

Cropland, woodland, pastureland, homesites

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, bigleaf maple
Major understory species: Western brackenfern, western swordfern, salal, elderberry, western hazel

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland

General management considerations:
• Steepness of slope and the seasonal high water table are the main limitations.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Wetness limits the choice of plants, the period of grazing, and the production of deep-rooted crops.
• A tillage pan forms easily if the soil is tilled when wet.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Reduce the risk of erosion by farming across the slope, fertilizing, and maintaining the organic matter content.
• Maintain the quality and quantity of forage by adjusting the stocking rate, especially on the steeper slopes; rotating grazing; mowing and harrowing to spread livestock droppings; controlling weeds; and applying fertilizer annually.

Building Site Development

General management considerations:
• Road cutbanks are subject to slumping.
• Septic tank absorption fields may function poorly because of the seasonal wetness and slow permeability, which restrict the movement and filtration of the effluent.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Reduce wetness by providing drainage around buildings with basements and crawl spaces, installing drain tile around footings, and providing drainage if roads and building foundations are to be constructed.
• Because slope is a concern in installing septic tank absorption fields, install absorption lines on the contour.
• Increase the size of the absorption area and use additional absorption lines and sandy backfill for the trench to compensate for the slow permeability.
• Because the soil is subject to slumping, especially in the steeper areas, locate roads in the more gently sloping areas and design drainage systems to minimize the risk of slumping.
• Reduce the risk of erosion on steep cuts and fills by establishing a plant cover.
• Preserve as many trees as possible.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.
• Provide drainage for best results with most lawn grasses, shade trees, ornamental trees, shrubs, and vegetable gardens.

Interpretive Groups

Capability subclass: 3e

102—Kelso silt loam, 15 to 30 percent slopes

Composition

Kelso and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces

Parent material: Old alluvium
Slope range: 15 to 30 percent
Elevation: 50 to 200 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 11 inches—very dark grayish brown silt loam
11 to 18 inches—dark yellowish brown silt loam
18 to 34 inches—mottled, dark yellowish brown and yellowish brown silty clay loam and silt loam
34 to 45 inches—mottled, yellowish brown and grayish brown silty clay loam
45 to 60 inches—mottled, dark yellowish brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—2 to 3 feet; months—December through March
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 15 percent or more than 30 percent
• Soils that are somewhat poorly drained
• Soils that are poorly drained
• Soils that are well drained

Major Uses

Woodland, pastureland, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, bigleaf maple
Major understory species: Western brackenfern, western swordfern, salal, elderberry, western hazel

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland

General management considerations:
• Steepness of slope and the seasonal high water table are the main limitations.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Wetness limits the choice of plants, the period of grazing, and the production of deep-rooted crops.
• A tillage pan forms easily if the soil is tilled when wet.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Reduce the risk of erosion by farming across the slope, fertilizing, and maintaining the organic matter content.
• Maintain the quality and quantity of forage by adjusting the stocking rate, especially on the steeper slopes; rotating grazing; mowing and harrowing to spread livestock droppings; controlling weeds; and applying fertilizer annually.

Interpretive Groups

Capability subclass: 4e

103—Kelso silt loam, 30 to 50 percent slopes

Composition

Kelso and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces, terrace escarpments
Parent material: Old alluvium
Slope range: 30 to 50 percent
Elevation: 50 to 200 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 11 inches—very dark grayish brown silt loam
11 to 18 inches—dark yellowish brown silt loam
18 to 34 inches—mottled, dark yellowish brown and yellowish brown silty clay loam
34 to 45 inches—mottled, yellowish brown and grayish brown silty clay loam and silt loam
45 to 60 inches—mottled, dark yellowish brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Seasonal high water table: Kind—perched; depth—2 to 3 feet; months—December through March
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 30 percent
- Soils that are somewhat poorly drained
- Soils that are well drained
- Soils that are poorly drained

Major Uses

Woodland, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, bigleaf maple
Major understory species: Western brackenfern, western swordfern, salal, elderberry, western hazel

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

104—Kosmos silt loam, 0 to 3 percent slopes

Composition

Kosmos and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Terraces
Parent material: Glaciofluvial material
Slope range: 0 to 3 percent
Elevation: 300 to 400 feet

Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 7 inches—dark gray silt loam
7 to 12 inches—mottled, gray silty clay loam
12 to 47 inches—mottled, gray silty clay loam and sandy clay loam
47 to 60 inches—grayish brown sandy clay loam and coarse sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—at the surface to a depth of 2 feet below the surface; months—November through May
Hazard of flooding: None

Included Areas

- Soils that are well drained
- Soils that are somewhat excessively drained

Major Uses

Woodland, pastureland, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Bigleaf maple, western redcedar, black cottonwood, Oregon ash
Major understory species: Salal, vine maple, western brackenfern, western hazel, sedge

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: Seasonal high water table
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland

General management considerations:
- The seasonal high water table is the main limitation.
- Most climatically adapted crops can be grown if adequate drainage is maintained.
- Grasses and legumes grow well if they are adequately fertilized.
- Wetness limits the choice of plants, the period of grazing, and the production of deep-rooted crops.
- Maintaining drainage is difficult because of the lack of suitable outlets.
- A tillage pan forms easily if the soil is tilled when wet.
- Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Either select plants that tolerate wetness or provide drainage.
- Maintain tile drains to reduce wetness if a suitable outlet is available.
- Provide supplemental irrigation in years of limited precipitation.
- Irrigate at a rate that will prevent the buildup of a high water table.
- Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Interpretive Groups

Capability subclass: 5w

105—Lacamas silt loam, 0 to 6 percent slopes

Composition

Lacamas and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Terraces
Parent material: Mixed alluvium derived from glacial and sedimentary material
Slope range: 0 to 6 percent
Elevation: 480 to 550 feet
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 4 inches—very dark gray silt loam
4 to 10 inches—mottled, dark gray silt loam
10 to 20 inches—mottled, grayish brown silty clay
20 to 60 inches—mottled, grayish brown clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderately slow
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: At the surface to a depth of 0.5 foot in December through April
Hazard of flooding: None

Included Areas

- Soils that are somewhat poorly drained
- Soils that have slopes of more than 6 percent

Major Uses

Woodland, pastureland, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, Oregon ash, bigleaf maple
Major understory species: Willow, vine maple, salal, western brackenfern, sedge

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—periodically
Restriction to planting: Seasonal high water table
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland

General management considerations:
- Most climatically adapted crops can be grown if adequate drainage is maintained.
- Shallow-rooted, water-tolerant plants can be grown.
- Grasses and legumes grow well if they are adequately fertilized.
- Wetness limits the choice of plants, the period of grazing, and the production of deep-rooted crops.
- Maintaining drainage is difficult because of the lack of suitable outlets.
- A tillage pan forms easily if the soil is tilled when wet.
- Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Either select plants that tolerate wetness or provide drainage.
- Maintain tile drains to reduce wetness if a suitable outlet is available.
- Provide supplemental irrigation in years of limited precipitation.
- Maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
- Maintain the quality and quantity of forage by rotating grazing, controlling weeds, and applying fertilizer annually.

Interpretive Groups

Capability subclass: 6w

106—Lates silt loam, 5 to 30 percent slopes

Composition

Lates and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from basalt
Slope range: 5 to 30 percent
Elevation: 1,800 to 2,600 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 43 to 45 degrees F
Growing season: 150 to 180 days (28 degrees F)

Typical Profile

4 inches to 0—organic mat
0 to 12 inches—very dark grayish brown and dark brown silt loam
12 to 36 inches—dark yellowish brown gravelly silt loam
36 inches—fractured basalt

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 20 to 40 inches
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that are wet
• Soils that have bedrock at a depth of less that 20 inches or more than 40 inches
• Soils that are less than 15 percent rock fragments throughout
• Soils that are more than 30 percent rock fragments throughout

Major Uses

Woodland, wildlife habitat

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Pacific silver fir, western redcedar, Sitka spruce, red alder, bigleaf maple
Major understory species: Salmonberry, western swordfern, salal, western brackenfern, trailing blackberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

107—Lates silt loam, 30 to 65 percent slopes

Composition

Lates and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from basalt
Slope range: 30 to 65 percent
Elevation: 1,800 to 2,600 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 43 to 45 degrees F
Growing season: 150 to 180 days (28 degrees F)

Typical Profile

4 inches to 0—organic mat

0 to 12 inches—very dark grayish brown and dark brown silt loam
12 to 36 inches—dark yellowish brown gravelly silt loam
36 inches—fractured basalt

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 20 to 40 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that have bedrock at a depth of less than 20 inches or more than 40 inches
• Soils that are less than 15 percent rock fragments throughout
• Soils that are more than 30 percent rock fragments throughout

Major Uses

Woodland, wildlife habitat

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Pacific silver fir, western redcedar, Sitka spruce, red alder, bigleaf maple
Major understory species: Salmonberry, western swordfern, salal, western brackenfern, trailing blackberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

108—Lates-Rock outcrop complex, 65 to 90 percent slopes

Composition

Lates and similar soils—55 percent
Rock outcrop—20 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from basalt
Slope range: 65 to 90 percent
Elevation: 1,800 to 2,600 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 43 to 45 degrees F
Growing season: 150 to 180 days (28 degrees F)

Lates

Typical profile

4 inches to 0—organic mat
0 to 12 inches—very dark grayish brown and dark brown silt loam
12 to 36 inches—dark yellowish brown gravelly silt loam
36 inches—fractured basalt

Soil properties and qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 20 to 40 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite or basalt

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that have bedrock at a depth of more than 40 inches or less than 20 inches
- Soils that are more than 35 percent rock fragments throughout

Major Uses

Woodland, wildlife habitat

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Pacific silver fir, western redcedar, Sitka spruce, red alder, bigleaf maple
Major understory species: Salmonberry, western swordfern, salal, western brackenfern, trailing blackberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction and erosion can be minimized by using appropriate cable yarding systems.
- Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil compaction and erosion.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restriction to planting: Rock outcrop
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Lates—7e; Rock outcrop—8s

109—Lithic Haplumbrepts, 50 to 100 percent slopes

Composition

Lithic Haplumbrepts and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Bluffs, canyon sidewalls, mountainslopes
Parent material: Residuum and colluvium derived from basalt
Slope range: 50 to 100 percent
Elevation: 20 to 1,800 feet
Mean annual precipitation: 60 to 110 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Reference Profile

2 inches to 0—organic mat
0 to 8 inches—very dark grayish brown gravelly sandy loam
8 to 20 inches—brown and dark brown gravelly clay loam, cobbly clay loam, and gravelly loam
20 inches—unweathered basalt

Soil Properties and Qualities

Depth class: Shallow
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 10 to 20 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 50 percent
- Soils that are more than 20 inches deep to bedrock
- Soils that are less than 15 percent gravel throughout
- Areas of Rock outcrop

Major Uses

Woodland, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, bigleaf maple, Pacific madrone
Major understory species: Salal, cascade Oregongrape, red huckleberry, vine maple, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: Rock outcrop
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

110—Lithic Umbric Vitrandepts, 0 to 15 percent slopes

Composition

Lithic Umbric Vitrandepts and similar soils—50 percent
Contrasting soils—50 percent

Setting

Position on landscape: Lava flows
Parent material: Volcanic ash and pumice over basalt
Slope range: 0 to 15 percent
Elevation: 500 to 3,200 feet
Mean annual precipitation: 100 to 130 inches
Mean annual air temperature: 38 to 48 degrees F
Growing season: 70 to 140 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Reference Profile

0 to 6 inches—gray sandy loam
6 to 11 inches—dark gray very gravelly loamy sand or gravelly loamy sand
11 inches—unweathered, highly fractured basalt

Soil Properties and Qualities

Depth class: Shallow
Drainage class: Well drained
Permeability: Moderately rapid
Available water capacity: Low
Potential rooting depth: 10 to 20 inches
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: None
Hazard of flooding: None

Included Areas

• Soils that are less than 10 inches or more than 20 inches deep to bedrock

Major Uses

Recreation, wildlife habitat

Interpretive Groups

Capability subclass: 7s

111—Lonestar sand, 30 to 65 percent slopes

Composition

Lonestar and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Volcanic ash and pumice over colluvium derived from igneous rock
Slope range: 30 to 65 percent
Elevation: 2,800 to 3,600 feet
Mean annual precipitation: 110 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

0 to 2 inches—dark gray sand
2 to 17 inches—dark brown sandy loam
17 to 24 inches—mottled, gray loamy sand
24 to 30 inches—mottled, dark brown sandy loam
30 to 60 inches—dark yellowish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that have a sandy loam surface layer
• Soils that are more than 25 percent rock fragments throughout
• Soils that are warmer

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western redcedar, western white pine
Major understory species: Huckleberry, lupine, vanillaleaf, rose, bunchberry dogwood

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

112—Lonestar loamy sand, overblown, 5 to 30 percent slopes

Composition

Lonestar, overblown, and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Volcanic ash and pumice over colluvium derived from igneous rock
Slope range: 5 to 30 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 110 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

0 to 5 inches—dark gray loamy sand
5 to 17 inches—dark brown sandy loam
17 to 24 inches—mottled, gray sandy loam
24 to 30 inches—mottled, dark brown loamy sand
30 to 60 inches—dark yellowish brown gravelly sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 5 percent or more than 30 percent
- Soils that have a sand surface layer
- Soils that are more than 25 percent rock fragments throughout
- Soils that are warmer
- Soils that have a loamy sand surface layer more than 5 inches thick
- Soils that do not have a loamy sand surface layer

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Huckleberry, lupine, vine maple, common beargrass, bunchberry dogwood, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: None
Restriction to planting: Deposits of volcanic ash on surface
General management considerations:
- Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

113—Lonestar loamy sand, overblown, 30 to 65 percent slopes

Composition

Lonestar, overblown, and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Volcanic ash and pumice over colluvium derived from igneous rock
Slope range: 30 to 65 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 110 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

0 to 5 inches—dark gray loamy sand
5 to 17 inches—dark brown sandy loam
17 to 24 inches—mottled, gray sandy loam
24 to 30 inches—mottled, dark brown loamy sand
30 to 60 inches—dark yellowish brown gravelly sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that have a sand surface layer
• Soils that are more than 25 percent rock fragments throughout
• Soils that are warmer
• Soils that have a loamy sand surface layer more than 5 inches thick
• Soils that do not have a loamy sand surface layer

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Huckleberry, lupine, vine maple, common beargrass, bunchberry dogwood, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restriction to planting: Deposits of volcanic ash on surface
General management considerations:
• Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

114—Lonestar loamy sand, overblown, 65 to 90 percent slopes

Composition

Lonestar, overblown, and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes
Parent material: Volcanic ash and pumice over colluvium derived from igneous rock
Slope range: 65 to 90 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 110 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

0 to 5 inches—dark gray loamy sand
5 to 17 inches—dark brown sandy loam
17 to 24 inches—mottled, gray sandy loam
24 to 30 inches—mottled, dark brown loamy sand
30 to 60 inches—dark yellowish brown gravelly sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that have a sand surface layer
- Soils that are more than 25 percent rock fragments throughout
- Soils that are warmer
- Soils that have a loamy sand surface layer more than 5 inches thick
- Soils that do not have a loamy sand surface layer

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Huckleberry, lupine, vine maple, common beargrass, bunchberry dogwood

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restriction to planting: Deposits of volcanic ash on surface
General management considerations:
- Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

115—Lonestar sandy loam, 5 to 30 percent slopes

Composition

Lonestar and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Volcanic ash and pumice over colluvium derived from igneous rock
Slope range: 5 to 30 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 110 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

0 to 10 inches—dark brown sandy loam
10 to 17 inches—dark brown sandy loam
17 to 24 inches—mottled, gray loamy sand
24 to 60 inches—mottled, dark brown and dark yellowish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 30 percent
- Soils that have a sand surface layer
- Soils that are more than 25 percent rock fragments throughout
- Soils that are warmer
- Soils that are wet

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western redcedar, western white pine
Major understory species: Huckleberry, lupine, vine maple, common beargrass, bunchberry dogwood

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
- Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation to reduce soil displacement.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

116—Lonestar sandy loam, 30 to 65 percent slopes

Composition

Lonestar and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Volcanic ash and pumice over colluvium derived from igneous rock
Slope range: 30 to 65 percent
Elevation: 2,800 to 4,500 feet

Mean annual precipitation: 110 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

0 to 10 inches—dark brown sandy loam
10 to 17 inches—dark brown sandy loam
17 to 24 inches—mottled, gray loamy sand
24 to 60 inches—mottled, dark brown and dark yellowish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 30 percent or more than 65 percent
- Soils that have a sand surface layer
- Soils that are more than 25 percent rock fragments throughout
- Soils that are warmer
- Soils that are wet

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western redcedar, western white pine
Major understory species: Huckleberry, lupine, vine maple, common beargrass, bunchberry dogwood

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

117—Lonestar sandy loam, 65 to 90 percent slopes

Composition

Lonestar and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes
Parent material: Volcanic ash and pumice over colluvium derived from igneous rock
Slope range: 65 to 90 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 110 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

0 to 10 inches—dark brown sandy loam
10 to 17 inches—dark brown sandy loam
17 to 24 inches—mottled, gray loamy sand

24 to 60 inches—mottled, dark brown and dark yellowish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that have a surface layer of sand
- Soils that are more than 25 percent rock fragments throughout
- Soils that are warmer

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western redcedar, western white pine
Major understory species: Huckleberry, lupine, vine maple, common beargrass, bunchberry dogwood

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

118—Lonestar sandy loam, tuff substratum, 5 to 30 percent slopes

Composition

Lonestar and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Volcanic ash and pumice over colluvium derived from highly weathered tuff and tuff breccia
Slope range: 5 to 30 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 110 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

0 to 10 inches—dark brown sandy loam
10 to 17 inches—dark brown sandy loam
17 to 24 inches—mottled, gray loamy sand
24 to 30 inches—mottled, dark brown loamy sand
30 to 50 inches—dark yellowish brown gravelly sandy loam
50 to 60 inches—weathered tuff

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 30 percent
- Soils that have a sand surface layer
- Soils that are more than 25 percent rock fragments throughout
- Soils that are warmer
- Soils that are wet
- Soils that have hard bedrock in the substratum

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western redcedar, western white pine
Major understory species: Huckleberry, lupine, vine maple, common beargrass, bunchberry dogwood

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
- Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation to reduce soil displacement.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

119—Loper silt loam, 20 to 30 percent slopes

Composition

Loper and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes, benches
Parent material: Colluvium derived from basalt with an admixture of loess and volcanic ash in the upper part and underlain by breccia and tuff
Slope range: 20 to 30 percent
Elevation: 700 to 1,800 feet
Mean annual precipitation: 60 to 80 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 12 inches—dark brown silt loam
12 to 28 inches—brown and dark brown loam
28 to 60 inches—dark reddish brown and reddish brown clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium

Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 20 percent or more than 30 percent
• Soils that are colder
• Soils that are gravelly throughout

Major Uses

Woodland, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Salmonberry, salal, cascade Oregongrape, vine maple, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

120—Loper silt loam, 30 to 65 percent slopes

Composition

Loper and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes
Parent material: Colluvium derived from basalt with an admixture of loess and volcanic ash in the upper part and underlain by breccia and tuff
Slope range: 30 to 65 percent
Elevation: 700 to 1,800 feet
Mean annual precipitation: 60 to 80 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 12 inches—dark brown silt loam
12 to 28 inches—brown and dark brown loam
28 to 60 inches—dark reddish brown and reddish brown clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent
• Soils that are colder
• Soils that are gravelly throughout

Major Uses

Woodland, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Salmonberry, salal, cascade Oregongrape, vine maple, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked

equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

121—Lytell silt loam, 5 to 30 percent slopes

Composition

Lytell and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Hillslopes, ridgetops
Parent material: Residuum and colluvium derived from siltstone and sandstone
Slope range: 5 to 30 percent
Elevation: 800 to 1,800 feet
Mean annual precipitation: 75 to 110 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 12 inches—very dark grayish brown silt loam
12 to 18 inches—dark brown silty clay loam
18 to 55 inches—brown and dark yellowish brown silty clay loam
55 to 65 inches—fractured, highly weathered siltstone

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 30 percent
• Soils that are less than 15 percent soft fragments throughout
• Soils that are more than 15 percent rock fragments throughout
• Soils that have soft bedrock at a depth of more than 60 inches

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock, red alder
Minor tree species: Western redcedar, Sitka spruce
Major understory species: Salal, salmonberry, western swordfern, vine maple, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface

insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

122—Lytell silt loam, 30 to 75 percent slopes

Composition

Lytell and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Hillslopes, ridgetops
Parent material: Residuum and colluvium derived from siltstone and sandstone
Slope range: 30 to 75 percent
Elevation: 800 to 1,800 feet
Mean annual precipitation: 75 to 110 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 12 inches—dark brown silt loam
12 to 18 inches—very dark grayish brown silty clay loam
18 to 55 inches—brown and dark yellowish brown silty clay loam
55 to 65 inches—fractured, highly weathered siltstone

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 70 percent
• Soils that are less than 15 percent soft fragments throughout
• Soils that are more than 15 percent rock fragments throughout
• Soils that have soft bedrock at a depth of more than 60 inches or less than 40 inches

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock, red alder
Minor tree species: Western redcedar, Sitka spruce
Major understory species: Salal, salmonberry, western swordfern, vine maple, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

123—Mart silt loam, 0 to 8 percent slopes

Composition

Mart and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes, ridgetops
Parent material: Residuum derived from andesite and volcanic breccia
Slope range: 0 to 8 percent
Elevation: 500 to 1,800 feet
Mean annual precipitation: 40 to 75 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 11 inches—very dark brown and very dark grayish brown silt loam
11 to 20 inches—very dark grayish brown silt loam
20 to 40 inches—dark brown and dark yellowish brown silty clay loam
40 to 60 inches—dark yellowish brown, very dark grayish brown, and dark grayish brown silty clay loam and silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 8 percent
• Soils that are more than 15 percent rock fragments throughout
• Soils that are wet

Major Uses

Cropland, woodland, pastureland, homesites, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple, grand fir
Major understory species: Western swordfern, vine maple, salmonberry, elderberry, western hazel

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
• Grasses and legumes grow well if they are adequately fertilized.
• A tillage pan forms easily if the soil is tilled when wet.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
• Septic tank absorption fields may function poorly because of the moderately slow permeability, which restricts the movement and filtration of the effluent.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Prevent structural damage that results from shrinking and swelling by designing foundations and footings to allow for shrinking and swelling, diverting runoff away from buildings, and backfilling with material that has low shrink-swell potential.
• Increase the size of the absorption area and use additional absorption lines and sandy backfill for the trench to compensate for the moderately slow permeability.
• Seed road cuts and fills to permanent vegetation.
• Preserve as many trees as possible.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 2e

124—Mart silt loam, 8 to 20 percent slopes

Composition

Mart and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes, ridgetops
Parent material: Residuum derived from andesite and volcanic breccia
Slope range: 8 to 20 percent
Elevation: 500 to 1,800 feet
Mean annual precipitation: 40 to 75 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 11 inches—very dark brown and very dark grayish brown silt loam
11 to 20 inches—very dark grayish brown silt loam
20 to 40 inches—dark brown and dark yellowish brown silty clay loam
40 to 60 inches—dark yellowish brown, very dark brown, grayish brown, and dark grayish brown silty clay loam and silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 8 percent or more than 20 percent
• Soils that are more than 15 percent rock fragments throughout

Major Uses

Cropland, woodland, pastureland, homesites, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple, grand fir
Major understory species: Western swordfern, vine maple, salmonberry, elderberry, western hazel

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as

road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
• Grasses and legumes grow well if they are adequately fertilized.
• A tillage pan forms easily if the soil is tilled when wet.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
• Seedbeds can be prepared on the contour or across the slope where practical.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by adjusting the stocking rate, especially on the steeper slopes; mowing and harrowing to spread livestock droppings; controlling weeds; and applying fertilizer annually.

Building Site Development

General management considerations:
• Septic tank absorption fields may function poorly because of the moderately slow permeability, which restricts the movement and filtration of the effluent.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Design and construct buildings and access roads to compensate for the steepness of slope.
• Use temporary sediment or debris basins to reduce the loss of soil material from construction sites.
• Preserve the existing plant cover during construction to reduce the risk of erosion.
• Prevent structural damage that results from shrinking and swelling by designing foundations and footings to allow for shrinking and swelling, diverting runoff away from buildings, and backfilling with material that has low shrink-swell potential.
• Increase the size of the absorption area and use additional absorption lines and sandy backfill for the trench to compensate for the moderately slow permeability.
• Because slope is a concern in installing septic tank absorption fields, install absorption lines on the contour.
• Stabilize disturbed areas to reduce the risk of erosion and to minimize the maintenance cost resulting from erosion.
• Seed road cuts and fills to permanent vegetation.
• Preserve as many trees as possible.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 3e

125—Mart silt loam, 20 to 30 percent slopes

Composition

Mart and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes, shoulders
Parent material: Residuum derived from andesite and volcanic breccia
Slope range: 20 to 30 percent
Elevation: 500 to 1,800 feet
Mean annual precipitation: 40 to 75 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 11 inches—very dark brown and very dark grayish brown silt loam
11 to 20 inches—very dark grayish brown silt loam
20 to 40 inches—dark brown and dark yellowish brown silty clay loam
40 to 60 inches—dark yellowish brown, very dark brown, grayish brown, and dark grayish brown silty clay loam and silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium

Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 20 percent or more than 30 percent
• Soils that are more than 15 percent rock fragments throughout

Major Uses

Pastureland, woodland, wildlife habitat

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple, grand fir
Major understory species: Western swordfern, vine maple, salmonberry, elderberry, western hazel

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

126—Mart silt loam, 30 to 65 percent slopes

Composition

Mart and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes
Parent material: Residuum derived from andesite and volcanic breccia
Slope range: 30 to 65 percent
Elevation: 500 to 1,800 feet
Mean annual precipitation: 40 to 75 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 11 inches—very dark brown and very dark grayish brown silt loam
11 to 20 inches—very dark grayish brown silt loam
20 to 40 inches—dark brown and dark yellowish brown silty clay loam
40 to 60 inches—dark yellowish brown, very dark brown, grayish brown, and dark grayish brown silty clay loam and silt loam

Soil Properties and Qualities

Depth class: Very deep

Drainage class: Well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent
• Soils that are more than 15 percent rock fragments throughout

Major Uses

Woodland, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple, grand fir
Major understory species: Western swordfern, vine maple, salmonberry, elderberry, western hazel

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

127—Maytown silt loam, 0 to 3 percent slopes

Composition

Maytown and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Flood plains
Parent material: Alluvium
Slope range: 0 to 3 percent
Elevation: 10 to 25 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 51 to 53 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 18 inches—very dark gray and very dark grayish brown silt loam
18 to 28 inches—light yellowish brown silt loam
28 to 36 inches—light brownish gray silty clay loam
36 to 60 inches—mottled, olive brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—apparent; depth—2.5 to 3.5 feet; months—November through April
Periods of flooding: Frequency—occasional; duration—brief; months—November through March

Included Areas

• Soils that are well drained
• Soils that are poorly drained
• Soils that are somewhat poorly drained
• Soils that have sand at a depth of 40 inches
• Soils that have mottles at a depth of 12 inches

Major Uses

Cropland (fig. 4), pastureland, homesites, woodland

Pastureland and Cropland

General management considerations:
- Most climatically adapted crops can be grown.
- Grasses and legumes grow well if they are adequately fertilized.
- The most suitable irrigation method is a sprinkler system.
- A tillage pan forms if the soil is excessively cultivated.
- Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Plant deep-rooted crops in areas where natural drainage is adequate or where a drainage system can be maintained.
- Maintain tile drains to reduce wetness if a suitable outlet is available.
- Provide irrigation and maintain drainage if management is intensive.
- Provide supplemental irrigation in years of limited precipitation.
- Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
- Increase the water intake rate by growing cover crops, returning crop residue to the soil, rotating crops, and keeping tillage at a minimum.
- Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures, rotating crops, and growing cover crops.
- Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
- Maintain tilth by returning crop residue to the soil, using a cropping system that includes grasses, legumes, or grass-legume mixtures, rotating crops, growing cover crops, and keeping tillage at a minimum.
- Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
- Maintain the quality and quantity of forage by

Figure 4.—Blueberries in an area of Maytown silt loam, 0 to 3 percent slopes.

rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
- Septic tank absorption fields may function poorly because of wetness and the moderately slow permeability, which restrict the movement and filtration of the effluent.

Suitable management practices:
- Reduce the risk of flooding by constructing small dikes and locating structures above the expected flood levels.
- Reduce wetness by providing drainage around buildings with basements and crawl spaces and installing drain tile around footings.
- Design buildings and roads to offset the limited ability of the soil to support a load.
- Increase the size of the absorption area to compensate for the moderately slow permeability.
- Use additional absorption lines and sandy backfill for the trench to compensate for the moderately slow permeability.
- Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.
- Provide drainage for best results with most lawn grasses, shade trees, ornamental trees, shrubs, and vegetable gardens.
- Mulch, fertilize, and irrigate to establish lawns.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Vine maple, western brackenfern, cascade Oregongrape, trailing blackberry, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 3w

128—Melbourne loam, 8 to 20 percent slopes

Composition

Melbourne and similar soils—90 percent
Contrasting soils—10 percent

Setting

Position on landscape: Hillslopes, ridgetops
Parent material: Residuum derived from siltstone
Slope range: 8 to 20 percent
Elevation: 200 to 800 feet
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

0 to 10 inches—very dark grayish brown loam
10 to 18 inches—dark brown silty clay loam
18 to 35 inches—brown silty clay
35 to 60 inches—dark yellowish brown silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 8 percent or more than 20 percent
- Soils that are more than 15 percent soft siltstone fragments throughout
- Soils that are moderately well drained

• Soils that are poorly drained
• Soils that are somewhat poorly drained
• Soils that have siltstone at a depth of less than 60 inches

Major Uses

Cropland, woodland, homesites, wildlife habitat, pastureland

Pastureland and Cropland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Maintain tilth by using a cropping system that includes grasses, legumes, or grass-legumes mixtures.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Salal, cascade Oregongrape, trailing blackberry, western brackenfern, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Building Site Development

General management considerations:
• Septic tank absorption fields may function poorly because of the moderately slow permeability.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Use temporary sediment or debris basins to reduce the loss of soil material from construction sites.
• In steeper areas, reduce the risk of erosion by disturbing only the part of the site that is used for construction.
• Prevent structural damage that results from shrinking and swelling by designing foundations and footings to allow for shrinking and swelling, diverting runoff away from buildings, and backfilling with material that has low shrink-swell potential.
• Because slope is a concern in installing septic tank absorption fields, install absorption lines on the contour.
• Increase the size of the absorption area and use additional absorption lines and sandy backfill for the trench to compensate for the moderately slow permeability.
• Install culverts to carry seasonal runoff where roads cross natural drainageways.
• Reduce the risk of erosion on steep cuts and fills by establishing a plant cover.
• Preserve as many trees as possible.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 3e

129—Melbourne loam, 20 to 30 percent slopes

Composition

Melbourne and similar soils—90 percent
Contrasting soils—10 percent

Setting

Position on landscape: Hillslopes
Parent material: Residuum derived from siltstone
Slope range: 20 to 30 percent
Elevation: 200 to 800 feet
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

0 to 10 inches—very dark grayish brown loam
10 to 18 inches—dark brown silty clay loam
18 to 35 inches—brown silty clay
35 to 60 inches—dark yellowish brown silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 20 percent or more than 30 percent
• Soils that are more than 15 percent soft siltstone fragments throughout
• Soils that are moderately well drained
• Soils that are poorly drained
• Soils that are somewhat poorly drained
• Soils that have siltstone at a depth of less than 60 inches

Major Uses

Woodland, wildlife habitat, watershed, pastureland

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Salal, cascade Oregongrape, trailing blackberry, western brackenfern, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.

• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

130—Minniece silt loam, 0 to 8 percent slopes

Composition

Minniece and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces
Parent material: Alluvium
Slope range: 0 to 8 percent
Elevation: 60 to 400 feet
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 12 inches—very dark brown and very dark grayish brown silt loam
12 to 42 inches—grayish brown silty clay
42 to 60 inches—dark grayish brown silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—at the surface to a depth of 2 feet below the surface; months—November through May
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 8 percent
• Soils that are moderately well drained
• Soils that are well drained
• Soils that are artificially drained
• Soils that have a silty clay loam surface layer

Major Uses

Woodland, pastureland, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, western hemlock, bigleaf maple, Oregon ash
Major understory species: Vine maple, salal, western brackenfern, trailing blackberry, sedge

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: Seasonal high water table
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland

General management considerations:
• Most climatically adapted crops can be grown if adequate drainage is maintained.
• Grasses and legumes grow well if they are adequately fertilized.
• Wetness limits the choice of plants, the period of grazing, and the production of deep-rooted crops.
• Maintaining drainage is difficult because of a lack of suitable outlets in most areas.
• A tillage pan forms easily if the soil is tilled when wet.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Either select plants that tolerate wetness or maintain drainage.
• Maintain tile drains to reduce wetness if a suitable outlet is available.

- Provide supplemental irrigation in years of limited precipitation.
- Irrigate at a rate that will prevent the buildup of a high water table.
- Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Interpretive Groups

Capability subclass: 6w

131—Mountsolo gravelly sand, 0 to 1 percent slopes

Composition

Mountsolo and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Terraces
Parent material: Recent volcanic gravelly mudflow
Slope range: 0 to 1 percent
Elevation: 400 to 1,200 feet
Mean annual precipitation: 60 to 80 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 12 inches—dark gray gravelly sand
12 to 48 inches—dark gray dense glacial till
48 to 60 inches—dark gray dense glacial till

Soil Properties and Qualities

Depth class: Shallow to dense material that restricts roots and the movement of air and water
Drainage class: Somewhat poorly drained
Permeability: Moderately rapid to a depth of 10 to 20 inches
Available water capacity: Moderate
Potential rooting depth: 10 to 20 inches
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—at the surface to a depth of 1.5 feet below the surface; months—November through April
Periods of flooding: Frequency—occasional; duration—very brief; months—November through April

Included Areas

- Soils that are moderately well drained
- Soils that are well drained
- Soils that are less than 25 percent gravel throughout
- Soils that are subject to frequent periods of flooding
- Soils that have slopes of more than 1 percent
- Soils that have mottles in the upper 6 inches

Major Uses

Wildlife habitat, recreation

Interpretive Groups

Capability subclass: 5w

132—Mulholland silt loam, 5 to 30 percent slopes

Composition

Mulholland and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Toeslopes, mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from tuff and tuffaceous breccia with a mantle of volcanic ash and loess
Slope range: 5 to 30 percent
Elevation: 500 to 1,800 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 175 to 200 days (28 degrees F)

Typical Profile

1.5 inches to 0—organic mat
0 to 12 inches—very dark brown and dark brown silt loam
12 to 52 inches—yellowish brown and dark yellowish brown silty clay loam
52 to 60 inches—dark yellowish brown and yellowish brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 30 percent
- Soils that are more than 35 percent soft fragments throughout
- Soils that have bedrock at a depth of less than 60 inches
- Soils that are colder
- Soils that are wet

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Salal, cascade Oregongrape, red huckleberry, western swordfern, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

133—Murnen silt loam, 5 to 30 percent slopes

Composition

Murnen and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountain benches, ridgetops
Parent material: Residuum derived from basalt and volcanic breccia with an admixture of volcanic ash and loess
Slope range: 5 to 30 percent
Elevation: 1,800 to 2,500 feet
Mean annual precipitation: 80 to 110 inches
Mean annual air temperature: 43 to 45 degrees F
Growing season: 150 to 180 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 13 inches—very dark brown silt loam
13 to 60 inches—dark brown and dark yellowish brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 5 percent or more than 30 percent
- Soils that are more than 15 percent rock fragments throughout
- Soils that have bedrock at a depth of less than 60 inches
- Soils that are warmer

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir

Minor tree species: Pacific silver fir, red alder, bigleaf maple
Major understory species: Salmonberry, red huckleberry, western swordfern, western brackenfern, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

134—Natal silty clay loam, 0 to 4 percent slopes

Composition

Natal and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Terraces
Parent material: Old alluvium
Slope range: 0 to 4 percent
Elevation: 300 to 600 feet
Mean annual precipitation: 45 to 65 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 165 to 180 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 9 inches—mottled, very dark gray silty clay loam
9 to 60 inches—mottled, dark grayish brown clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Very slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—apparent; depth—at the surface to a depth of 1 foot below the surface; months—December through April
Hazard of flooding: None

Included Areas

• Soils that are subject to flooding
• Soils that are well drained
• Soils that have organic layers
• Soils that have been drained

Major Uses

Woodland, pastureland, wildlife habitat

Woodland

Composition

Principal tree species: Red alder
Minor tree species: Bigleaf maple, black cottonwood, Oregon ash, western redcedar
Major understory species: Salal, vine maple, western hazel, western brackenfern, elderberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily

Restriction to planting: High water table
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland

General management considerations:
• Shallow-rooted, water-tolerant plants can be grown.
• Grasses and legumes grow well if they are adequately fertilized.
• Supplemental irrigation is needed.
• Wetness limits the choice of plants and the period of grazing.
• Maintaining drainage is difficult because of the lack of suitable outlets.
• A tillage pan forms easily if the soil is tilled when wet.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Either select plants that tolerate wetness or provide drainage.
• Seed only the hay and pasture plants that tolerate periodic inundation and seasonal wetness.
• Maintain open ditches or tile drains to remove water on or near the surface.
• Manage the water table by maintaining a drainage system.
• Provide supplemental irrigation in years of limited precipitation.
• Because of the slow permeability of the subsoil, regulate the application of water so that it does not stand on the surface and damage the crops.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Interpretive Groups

Capability subclass: 5w

135—Newaukum gravelly silt loam, tuff substratum, 8 to 30 percent slopes

Composition

Newaukum and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, hillslopes
Parent material: Residuum derived from tuff and a mixture of andesitic colluvium and glacial debris with an admixture of volcanic ash
Slope range: 8 to 30 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 60 to 75 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 175 to 200 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 8 inches—dark brown gravelly silt loam
8 to 30 inches—dark brown gravelly silt loam and gravelly loam
30 to 41 inches—dark yellowish brown gravelly loam
41 to 51 inches—tuffaceous material

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 8 percent or more than 30 percent
• Soils that are less than 10 percent pebbles throughout
• Soils that are cobbly throughout
• Soils that are cobbly in the upper 8 inches
• Soils that are colder
• Soils that are more than 25 percent pebbles and cobbles
• Soils that are wet

Major Uses

Woodland, wildlife habitat, recreation, watershed, pastureland

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.

• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, western swordfern, western brackenfern, salal, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

136—Newaukum gravelly silt loam, tuff substratum, 30 to 65 percent slopes

Composition

Newaukum and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, hillslopes
Parent material: Residuum derived from tuff and a mixture of andesitic colluvium and glacial debris with an admixture of volcanic ash
Slope range: 30 to 65 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 60 to 75 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 175 to 200 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 8 inches—dark brown gravelly silt loam
8 to 30 inches—dark brown gravelly silt loam and gravelly loam
30 to 41 inches—dark yellowish brown gravelly loam
41 to 51 inches—tuffaceous material

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are less than 10 percent pebbles throughout
• Soils that are cobbly throughout
• Soils that are cobbly in the upper 8 inches
• Soils that are colder
• Soils that are more than 25 percent pebbles and cobbles

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, western swordfern, western brackenfern, salal, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

137—Newaukum cobbly silt loam, 5 to 30 percent slopes

Composition

Newaukum and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, hillslopes
Parent material: Colluvium and glaciofluvial deposits derived dominantly from volcanic ash, till, and andesite with an admixture of volcanic ash
Slope range: 5 to 30 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 60 to 75 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 160 to 200 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 8 inches—dark brown cobbly silt loam
8 to 30 inches—dark brown gravelly silt loam and gravelly loam
30 to 41 inches—dark yellowish brown gravelly loam
41 to 60 inches—strong brown gravelly silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that are less than 10 percent pebbles throughout
• Soils that are cobbly throughout
• Soils that are colder
• Soils that are more than 25 percent pebbles and cobbles
• Soils that have compact glacial till at a depth of 40 to 60 inches
• Soils that are wet

Major Uses

Pastureland, woodland, wildlife habitat, recreation, watershed

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, western swordfern, western brackenfern, salal, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: Cobbles in the soil
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

138—Newaukum cobbly silt loam, 30 to 65 percent slopes

Composition

Newaukum and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, hillslopes
Parent material: Colluvium and glaciofluvial deposits derived dominantly from volcanic ash, till, and andesite with an admixture of volcanic ash
Slope range: 30 to 65 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 60 to 75 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 160 to 200 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 8 inches—dark brown cobbly silt loam
8 to 30 inches—dark brown gravelly silt loam and gravelly loam
30 to 41 inches—dark yellowish brown gravelly loam
41 to 60 inches—strong brown gravelly silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are less than 10 percent pebbles throughout

- Soils that are cobbly throughout
- Soils that are colder
- Soils that are more than 25 percent pebbles and cobbles
- Soils that have compact glacial till at a depth of 40 to 60 inches

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, western swordfern, western brackenfern, salal, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: Cobbles in the soil
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

139—Newaukum cobbly silt loam, 65 to 90 percent slopes

Composition

Newaukum and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, hillslopes
Parent material: Colluvium and glaciofluvial deposits derived dominantly from volcanic ash, till, and andesite with an admixture of volcanic ash
Slope range: 65 to 90 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 60 to 75 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 160 to 200 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 8 inches—dark brown cobbly silt loam
8 to 30 inches—dark brown gravelly silt loam and gravelly loam
30 to 41 inches—dark yellowish brown gravelly loam
41 to 60 inches—strong brown gravelly silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that are less than 10 percent pebbles throughout
- Soils that are cobbly throughout
- Soils that are colder
- Soils that are more than 25 percent pebbles and cobbles
- Soils that have compact glacial till at a depth of 40 to 60 inches

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, western swordfern, western brackenfern, salal, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: Cobbles in the soil
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

140—Newaukum-Rock outcrop complex, 15 to 65 percent slopes

Composition

Newaukum and similar soils—45 percent
Rock outcrop—30 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, hillslopes
Parent material: Colluvium and glaciofluvial deposits derived dominantly from volcanic ash, till, and andesite with an admixture of volcanic ash
Slope range: 15 to 65 percent
Elevation: 600 to 1,800 feet
Mean annual precipitation: 60 to 75 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 160 to 200 days (28 degrees F)

Newaukum

Typical profile

3 inches to 0—organic mat
0 to 8 inches—dark brown cobbly silt loam
8 to 30 inches—dark brown gravelly silt loam and gravelly loam
30 to 41 inches—dark yellowish brown gravelly loam
41 to 60 inches—strong brown gravelly silt loam

Soil properties and qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Medium or rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs and dikes of andesite and basalt

Included Areas

• Soils that have slopes of less than 15 percent or more than 65 percent
• Soils that are less than 10 percent pebbles throughout
• Soils that are cobbly throughout
• Soils that are colder
• Soils that are more than 25 percent pebbles and cobbles
• Soils that have compact glacial till at a depth of 40 to 60 inches

• Soils that have bedrock at a depth of less than 60 inches

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, western swordfern, western brackenfern, salal, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion on slopes of more than 30 percent; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems on slopes of more than 30 percent.
• To minimize soil compaction, use designated skid trails on slopes of less than 30 percent and schedule equipment operations for periods in summer and fall when the soil is dry.
• Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil compaction and erosion.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: Rock outcrop, cobbles in the soil

General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Newaukum—7e;
Rock outcrop—8s

141—Newberg fine sandy loam, 0 to 3 percent slopes

Composition

Newberg and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Flood plains
Parent material: Mixed alluvium
Slope range: 0 to 3 percent
Elevation: 10 to 50 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 51 to 53 degrees F
Growing season: 200 to 220 days (28 degrees F)

Typical Profile

0 to 10 inches—very dark grayish brown fine sandy loam
10 to 28 inches—brown and very dark grayish brown fine sandy loam and very fine sandy loam
28 to 60 inches—dark brown loamy fine sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Periods of flooding: Frequency—occasional; duration—brief; months—December through March

Included Areas

• Soils that are wet
• Soils that are somewhat poorly drained
• Soils that are somewhat excessively drained
• Soils that have a silt loam surface layer
• Soils that are silt loam in the upper 30 inches

Major Uses

Cropland, pastureland, homesites, woodland (fig. 5)

Pastureland and Cropland

General management considerations:
• Most climatically adapted crops can be grown.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
• Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures, rotating crops, and growing cover crops.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Maintain tilth by returning crop residue to the soil, using a cropping system that includes grasses, legumes, or grass-legume mixtures, rotating crops, and growing cover crops.
• Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
• The risk of pollution of the ground water supply as a result of seepage limits the use of this unit for septic tank absorption fields.

Figure 5.—Hybrid cottonwood plantation and pastureland in an area of Newberg fine sandy loam, 0 to 3 percent slopes.

• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Reduce the risk of flooding by locating structures above the expected flood level.
• Construct special retainer walls in shallow excavations to prevent cutbanks from caving in.
• Protect onsite sewage disposal systems from flooding.
• Provide an adequate wearing surface on roads to minimize dust and maintenance costs.
• Install culverts to carry seasonal runoff where roads cross natural drainageways.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.
• Select adapted plants in establishing lawns, shrubs, trees, and vegetable gardens.
• Irrigate frequently because of the limited available water capacity.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Bigleaf maple, black cottonwood, western redcedar, Oregon ash
Major understory species: Trailing blackberry, western brackenfern, vine maple, cascara buckthorn, willow

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 3w

142—Olequa silt loam, 0 to 8 percent slopes

Composition

Olequa and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces, plains
Parent material: Old alluvium
Slope range: 0 to 8 percent
Elevation: 40 to 300 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 50 to 53 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

0 to 8 inches—very dark grayish brown silt loam
8 to 20 inches—dark brown silt loam
20 to 60 inches—dark yellowish brown and brown silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 8 percent
• Soils that are wet
• Soils that are moderately well drained

Major Uses

Cropland, woodland, pastureland, homesites, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, bigleaf maple
Major understory species: Trailing blackberry, western brackenfern, western swordfern, northern twinflower, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
• Grasses and legumes grow well if they are adequately fertilized.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• A tillage pan forms easily if the soil is tilled when wet.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Irrigate at a rate that ensures optimum production but does not increase deep percolation, runoff, and erosion.
• Apply water at a slow rate over a long period to ensure that the root zone is properly wetted.
• Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
• Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
• Septic tank absorption fields may function poorly because of the moderate permeability, which restricts the movement and filtration of the effluent.
Suitable management practices:
• Increase the size of the absorption area and use additional absorption lines and sandy backfill for the trench to compensate for the moderate permeability.
• Preserve as many trees as possible.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 2e

143—Olequa silt loam, 8 to 20 percent slopes

Composition

Olequa and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces, plains
Parent material: Old alluvium
Slope range: 8 to 20 percent
Elevation: 40 to 300 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 50 to 53 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

0 to 8 inches—very dark grayish brown silt loam
8 to 20 inches—dark brown silt loam
20 to 60 inches—dark yellowish brown and brown silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 8 percent or more than 20 percent
- Soils that are moderately well drained
- Soils that are somewhat poorly drained
- Soils that are poorly drained

Major Uses

Cropland, woodland, pastureland, homesites, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, bigleaf maple
Major understory species: Trailing blackberry, western brackenfern, western swordfern, northern twinflower, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
- Steepness of slope is the main limitation.
- Grasses and legumes grow well if they are adequately fertilized.
- Supplemental irrigation is needed for crops.
- The most suitable irrigation method is a sprinkler system.
- A tillage pan forms easily if the soil is tilled when wet.
- Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Provide supplemental irrigation in years of limited precipitation.
- Irrigate at a rate that ensures optimum production but does not increase deep percolation, runoff, and erosion.
- Apply water at a slow rate over a long period to ensure that the root zone is properly wetted.
- Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
- Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
- Reduce the risk of erosion by farming across the slope, fertilizing, and seeding on the contour or across the slope.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
- Septic tank absorption fields may function poorly because of the moderate permeability, which restricts the movement and filtration of the effluent.

Suitable management practices:
- Because slope is a concern in installing septic tank absorption fields, install absorption lines on the contour.
- Increase the size of the absorption area and use additional absorption lines and sandy backfill for the trench to compensate for the moderate permeability.
- Preserve as many trees as possible.
- Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
- Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 3e

144—Olequa silt loam, 20 to 30 percent slopes

Composition

Olequa and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces, hillslopes
Parent material: Old alluvium
Slope range: 20 to 30 percent
Elevation: 40 to 300 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 50 to 53 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

0 to 8 inches—very dark grayish brown silt loam
8 to 20 inches—dark brown silt loam
20 to 60 inches—dark yellowish brown and brown silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 20 percent or more than 30 percent
- Soils that are moderately well drained

Major Uses

Pastureland, woodland, wildlife habitat

Pastureland

General management considerations:
- Steepness of slope is the main limitation.
- Grasses and legumes grow well if they are adequately fertilized.
- The most suitable irrigation method is a sprinkler system.
- Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Provide supplemental irrigation in years of limited precipitation.
- Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, bigleaf maple
Major understory species: Trailing blackberry, western brackenfern, western swordfern, northern twinflower, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

145—Olequa silt loam, 30 to 65 percent slopes

Composition

Olequa and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces, hillslopes, terrace escarpments
Parent material: Old alluvium
Slope range: 30 to 65 percent
Elevation: 40 to 300 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 50 to 53 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

0 to 8 inches—very dark grayish brown silt loam
8 to 20 inches—dark brown silt loam
20 to 60 inches—dark yellowish brown and brown silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 30 percent or more than 65 percent
- Soils that are moderately well drained

Major Uses

Woodland (fig. 6), wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, bigleaf maple
Major understory species: Trailing blackberry, western brackenfern, western swordfern, northern twinflower, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

146—Olympic silt loam, 2 to 8 percent slopes

Composition

Olympic and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Hillslopes, mountainslopes
Parent material: Residuum and colluvium derived from basalt
Slope range: 2 to 8 percent
Elevation: 200 to 1,800 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 175 to 240 days (28 degrees F)

Figure 6.—Woodland in an area of Olequa silt loam, 30 to 65 percent slopes, in center.

Typical Profile

2 inches to 0—organic mat
0 to 4 inches—dark reddish brown silt loam
4 to 14 inches—dark reddish brown silt loam
14 to 38 inches—dark reddish brown and yellowish red silty clay loam and silty clay
38 to 60 inches—yellowish red silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 8 percent
- Soils that are moderately well drained
- Soils that have bedrock at a depth of 40 to 60 inches
- Soils that are gravelly throughout

Major Uses

Cropland, woodland, pastureland, homesites, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, western swordfern, red huckleberry, vine maple, salal

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
• Grasses and legumes grow well if they are adequately fertilized.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• A tillage pan forms easily if the soil is tilled when wet.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Irrigate at a rate that ensures optimum production but does not increase deep percolation, runoff, and erosion.
• Apply water at a slow rate over a long period to ensure that the root zone is properly wetted.
• Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
• Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
• Septic tank absorption fields may function poorly because of the moderate permeability, which restricts the movement and filtration of the effluent.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Increase the size of the absorption area to compensate for the moderate permeability.
• Prevent structural damage that results from shrinking and swelling by designing foundations and footings to allow for shrinking and swelling, diverting runoff away from buildings, and backfilling with material that has low shrink-swell potential.
• Increase the size of the absorption area and use additional absorption lines and sandy backfill for the trench to compensate for the moderate permeability.
• Preserve as many trees as possible.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.
• Stabilize disturbed areas to reduce the risk of erosion and the maintenance cost resulting from erosion.

Interpretive Groups

Capability subclass: 2e

147—Olympic silt loam, 8 to 20 percent slopes

Composition

Olympic and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Hillslopes, mountainslopes
Parent material: Residuum and colluvium derived from basalt
Slope range: 8 to 20 percent
Elevation: 200 to 1,800 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 4 inches—dark reddish brown silt loam

4 to 14 inches—dark reddish brown silt loam
14 to 38 inches—dark reddish brown and yellowish red silty clay loam and silty clay
38 to 60 inches—yellowish red silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 8 percent or more than 20 percent
• Soils that are moderately well drained
• Soils that have bedrock at a depth of 40 to 60 inches
• Soils that are gravelly throughout

Major Uses

Cropland, woodland, pastureland, homesites, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, western swordfern, red huckleberry, vine maple, salal

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• A tillage pan forms easily if the soil is tilled when wet.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Irrigate at a rate that ensures optimum production but does not increase deep percolation, runoff, and erosion.
• Apply water at a slow rate over a long period to ensure that the root zone is properly wetted.
• Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
• Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Reduce the risk of erosion by farming across the slope, fertilizing, and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
• Septic tank absorption fields may function poorly

because of the moderate permeability, which restricts the movement and filtration of the effluent.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Use temporary sediment or debris basins to reduce the loss of soil material from construction sites.
• Preserve the existing plant cover during construction to reduce the risk of erosion.
• Prevent structural damage that results from shrinking and swelling by designing foundations and footings to allow for shrinking and swelling, diverting runoff away from buildings, and backfilling with material that has low shrink-swell potential.
• Because slope is a concern in installing septic tank absorption fields, install absorption lines on the contour.
• Increase the size of the absorption area and use additional absorption lines and sandy backfill for the trench to compensate for the moderate permeability.
• Install culverts to carry seasonal runoff where roads cross natural drainageways.
• Preserve as many trees as possible.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 3e

148—Olympic silt loam, 20 to 30 percent slopes

Composition

Olympic and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Hillslopes, mountainslopes
Parent material: Residuum and colluvium derived from basalt
Slope range: 20 to 30 percent
Elevation: 200 to 1,800 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 4 inches—dark reddish brown silt loam
4 to 14 inches—dark reddish brown silt loam
14 to 38 inches—dark reddish brown and yellowish red silty clay loam and silty clay
38 to 60 inches—yellowish red silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 20 percent or more than 30 percent
• Soils that are moderately well drained
• Soils that have bedrock at a depth of 40 to 60 inches
• Soils that are gravelly throughout

Major Uses

Pastureland, woodland, wildlife habitat

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, western swordfern, red huckleberry, vine maple, salal

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

149—Olympic silt loam, 30 to 65 percent slopes

Composition

Olympic and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Hillslopes, mountainslopes
Parent material: Residuum and colluvium derived from basalt
Slope range: 30 to 65 percent
Elevation: 200 to 1,800 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 4 inches—dark reddish brown silt loam
4 to 14 inches—dark reddish brown silt loam
14 to 38 inches—dark reddish brown and yellowish red silty clay loam and silty clay
38 to 60 inches—yellowish red silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are moderately well drained
• Soils that have bedrock at a depth of 40 to 60 inches
• Soils that are gravelly throughout

Major Uses

Woodland, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, western swordfern, red huckleberry, vine maple, salal

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.

• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

150—Olympic silt loam, tuff substratum, 5 to 30 percent slopes

Composition

Olympic and similar soils—70 percent
Contrasting soils—30 percent

Setting

Position on landscape: Benches, terraces, hillslopes
Parent material: Residuum and colluvium derived from tuff
Slope range: 5 to 30 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 8 inches—dark reddish brown silt loam
8 to 24 inches—dark reddish brown and yellowish red silty clay loam
24 to 50 inches—yellowish red silty clay
50 inches—weathered tuffaceous material

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that are poorly drained
• Soils that are somewhat poorly drained
• Soils that are moderately well drained
• Soils that have bedrock at a depth of 40 to 60 inches
• Soils that are gravelly throughout

Major Uses

Cropland, woodland, pastureland, wildlife habitat

Pastureland and Cropland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, western swordfern, red huckleberry, vine maple, salal

Harvesting practices

Suitability of logging systems: Wheeled and tracked

equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

151—Panamaker gravelly sand, 0 to 3 percent slopes

Composition

Panamaker and similar soils—90 percent
Contrasting soils—10 percent

Setting

Position on landscape: Terraces
Parent material: Sandy dredge material derived from volcanic mudflow
Slope range: 0 to 3 percent
Elevation: 200 to 600 feet
Mean annual precipitation: 45 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 3 inches—dark gray gravelly sand
3 to 60 inches—dark gray sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: None
Hazard of wind erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Frequency of flooding: Rare

Included Areas

• Soils that are somewhat poorly drained
• Soils that are poorly drained
• Soils that are gravelly throughout
• Soils that are underlain by mudflow

Major Use

Wildlife habitat

Interpretive Groups

Capability subclass: 4s

152—Panamaker gravelly sand, flooded, 0 to 1 percent slopes

Composition

Panamaker and similar soils—90 percent
Contrasting soils—10 percent

Setting

Position on landscape: Flood plains
Parent material: Volcanic mudflow
Slope range: 0 to 1 percent
Elevation: 200 to 600 feet
Mean annual precipitation: 60 to 80 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 6 inches—dark gray gravelly sand
6 to 60 inches—dark gray loamy sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: None
Hazard of wind erosion: Moderate

Depth to seasonal high water table: More than 5 feet
Periods of flooding: Frequency—occasional; duration—brief; months—November through April

Included Areas

- Soils that are somewhat poorly drained
- Soils that are poorly drained
- Soils that are gravelly throughout
- Soils that are not subject to flooding

Major Uses

Wildlife habitat, recreation

Interpretive Groups

Capability subclass: 3w

153—Pheeney gravelly silt loam, 5 to 30 percent slopes

Composition

Pheeney and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Benches, mountainslopes, broad ridgetops
Parent material: Residuum and colluvium derived from andesite and andesitic flow breccia with an admixture of volcanic ash
Slope range: 5 to 30 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 60 to 85 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 140 to 190 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

3 inches to 0—organic mat
0 to 7 inches—very dark brown gravelly silt loam
7 to 15 inches—very dark grayish brown gravelly silt loam
15 to 24 inches—dark brown extremely cobbly silt loam
24 to 36 inches—dark yellowish brown extremely cobbly silt loam
36 inches—fractured andesite

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 20 to 40 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 5 percent or more than 30 percent
- Soils that have bedrock at a depth of less than 20 inches or more than 40 inches
- Soils that are poorly drained
- Soils that are somewhat poorly drained
- Soils that are moderately well drained
- Soils that are colder or warmer
- Soils that are less than 35 percent rock fragments throughout

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Red alder, bigleaf maple, western redcedar
Major understory species: Western brackenfern, vine maple, cascade Oregongrape, western swordfern, salal

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

154—Pheeney gravelly silt loam, 30 to 65 percent slopes

Composition

Pheeney and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Benches, mountainslopes, broad ridgetops
Parent material: Residuum and colluvium derived from andesite and andesitic flow breccia with an admixture of volcanic ash
Slope range: 30 to 65 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 60 to 85 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 140 to 190 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

3 inches to 0—organic mat
0 to 7 inches—very dark brown gravelly silt loam
7 to 15 inches—very dark grayish brown gravelly silt loam
15 to 24 inches—dark brown extremely cobbly silt loam
24 to 36 inches—dark yellowish brown extremely cobbly silt loam
36 inches—fractured andesite

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 20 to 40 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that have bedrock at a depth of less than 20 inches or more than 40 inches
• Soils that are poorly drained
• Soils that are somewhat poorly drained
• Soils that are moderately well drained
• Soils that are colder or warmer
• Soils that are less than 35 percent rock fragments throughout

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Red alder, bigleaf maple, western redcedar
Major understory species: Western brackenfern, vine maple, cascade Oregongrape, western swordfern, salal

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

155—Pheeney gravelly silt loam, 65 to 90 percent slopes

Composition

Pheeney and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Benches, mountainslopes, broad ridgetops
Parent material: Residuum and colluvium derived from andesite and andesitic flow breccia with an admixture of volcanic ash
Slope range: 65 to 90 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 60 to 85 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 140 to 190 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

3 inches to 0—organic mat
0 to 7 inches—very dark brown gravelly silt loam
7 to 15 inches—very dark grayish brown gravelly silt loam
15 to 24 inches—dark brown extremely cobbly silt loam
24 to 36 inches—dark yellowish brown extremely cobbly silt loam
36 inches—fractured andesite

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 20 to 40 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 65 percent
• Soils that have bedrock at a depth of less than 20 inches or more than 40 inches
• Soils that are moderately well drained
• Soils that are colder or warmer
• Soils that are less than 35 percent rock fragments throughout

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Red alder, bigleaf maple, western redcedar
Major understory species: Western brackenfern, vine maple, cascade Oregongrape, western swordfern, salal

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface

insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—readily
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

156—Pheeney-Beigle complex, 5 to 30 percent slopes

Composition

Pheeney and similar soils—45 percent
Beigle and similar soils—35 percent
Contrasting soils—20 percent

Setting

Position on landscape: Benches, ridgetops
Parent material: Residuum and colluvium derived from andesite and andesitic flow breccia with an admixture of volcanic ash
Slope range: 5 to 30 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 60 to 85 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 140 to 190 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

Pheeney

3 inches to 0—organic mat
0 to 7 inches—very dark brown gravelly silt loam
7 to 15 inches—very dark grayish brown gravelly silt loam
15 to 24 inches—dark brown extremely cobbly silt loam
24 to 36 inches—dark yellowish brown extremely cobbly silt loam
36 inches—fractured andesite

Beigle

2 inches to 0—organic mat
0 to 13 inches—very dark brown silt loam
13 to 17 inches—dark brown silt loam
17 to 25 inches—dark yellowish brown silt loam
25 to 42 inches—brown gravelly silt loam
42 to 46 inches—brown very gravelly loam
46 inches—highly fractured, weathered andesite

Soil Properties and Qualities

Depth class: Pheeney—moderately deep; Beigle—deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Pheeney—moderate; Beigle—high
Potential rooting depth: Pheeney—20 to 40 inches; Beigle—40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that have bedrock at a depth of less than 20 inches or more than 60 inches
• Soils that are poorly drained
• Soils that are somewhat poorly drained
• Soils that are moderately well drained
• Soils that are colder or warmer
• Soils that are less than 35 percent rock fragments throughout

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Pheeney—western brackenfern, vine maple, cascade Oregongrape, western swordfern, salal; Beigle—vine maple,

cascade Oregongrape, red huckleberry, western swordfern, trailing blackberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration (Pheeney): Western hemlock—readily
Potential for natural regeneration (Beigle): Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

157—Pheeney-Beigle complex, 30 to 65 percent slopes

Composition

Pheeney and similar soils—45 percent
Beigle and similar soils—35 percent
Contrasting components—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite and andesitic flow breccia with an admixture of volcanic ash
Slope range: 30 to 65 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 60 to 85 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 140 to 190 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

Pheeney

3 inches to 0—organic mat
0 to 7 inches—very dark brown gravelly silt loam
7 to 15 inches—very dark grayish brown gravelly silt loam
15 to 24 inches—dark brown extremely cobbly silt loam
24 to 36 inches—dark yellowish brown extremely cobbly silt loam
36 inches—fractured andesite

Beigle

2 inches to 0—organic mat
0 to 13 inches—very dark brown silt loam
13 to 17 inches—dark brown silt loam
17 to 25 inches—dark yellowish brown silt loam
25 to 42 inches—brown gravelly silt loam
42 to 46 inches—brown very gravelly loam
46 inches—highly fractured, weathered andesite

Soil Properties and Qualities

Depth class: Pheeney—moderately deep; Beigle—deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Pheeney—moderate; Beigle—high
Potential rooting depth: Pheeney—20 to 40 inches; Beigle—40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that have bedrock at a depth of more than 60 inches
• Soils that have bedrock at a depth of less than 20 inches
• Soils that are moderately well drained
• Soils that are colder or warmer

- Soils that are less than 35 percent rock fragments throughout
- Rock outcrop

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Pheeney—western brackenfern, vine maple, cascade Oregongrape, western swordfern, salal; Beigle—vine maple, cascade Oregongrape, red huckleberry, western swordfern, trailing blackberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction and erosion can be minimized by using appropriate cable yarding systems.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration (Pheeney): Western hemlock—readily
Potential for natural regeneration (Beigle): Western hemlock and red alder—readily
Restrictions to planting: None

General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

158—Pheeney-Rock outcrop complex, 30 to 65 percent slopes

Composition

Pheeney and similar soils—65 percent
Rock outcrop—20 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes, broad ridgetops
Parent material: Residuum and colluvium derived from andesite and andesitic flow breccia with an admixture of volcanic ash
Slope range: 30 to 65 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 60 to 85 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 140 to 190 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Pheeney

Typical profile

3 inches to 0—organic mat
0 to 7 inches—very dark brown gravelly silt loam
7 to 15 inches—very dark grayish brown gravelly silt loam
15 to 24 inches—dark brown extremely cobbly silt loam
24 to 36 inches—dark yellowish brown extremely cobbly silt loam
36 inches—fractured andesite

Soil properties and qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 20 to 40 inches
Runoff: Rapid
Hazard of water erosion: Severe

Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite

Included Areas

- Soils that have slopes of less than 30 percent or more than 65 percent
- Soils that have bedrock at a depth of less than 20 inches or more than 40 inches
- Soils that are moderately well drained
- Soils that are colder or warmer
- Soils that are less than 35 percent rock fragments throughout

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Red alder, bigleaf maple, western redcedar
Major understory species: Western brackenfern, vine maple, cascade Oregongrape, western swordfern, salal

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction and erosion can be minimized by using appropriate cable yarding systems.
- Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil compaction and erosion.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—readily
Restriction to planting: Rock outcrop
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Pheeney—7e; Rock outcrop—8s

159—Pheeney-Rock outcrop complex, 65 to 90 percent slopes

Composition

Pheeney and similar soils—60 percent
Rock outcrop—25 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite and andesitic flow breccia with an admixture of volcanic ash
Slope range: 65 to 90 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 60 to 85 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 140 to 190 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Pheeney

Typical profile

3 inches to 0—organic mat
0 to 7 inches—very dark brown gravelly silt loam
7 to 15 inches—very dark grayish brown gravelly silt loam

15 to 24 inches—dark brown extremely cobbly silt loam
24 to 36 inches—dark yellowish brown extremely cobbly silt loam
36 inches—fractured andesite

Soil properties and qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 20 to 40 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that have bedrock at a depth of less than 20 inches or more than 40 inches
- Soils that are poorly drained
- Soils that are somewhat poorly drained
- Soils that are moderately well drained
- Soils that are colder or warmer
- Soils that are less than 35 percent rock fragments throughout

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Red alder, bigleaf maple, western redcedar
Major understory species: Western brackenfern, vine maple, cascade Oregongrape, western swordfern, salal

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction and erosion can be minimized by using appropriate cable yarding systems.
- Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil compaction and erosion.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—readily
Restriction to planting: Rock outcrop
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Pheeney—7e; Rock outcrop—8s

160—Pilchuck loamy fine sand, 0 to 8 percent slopes

Composition

Pilchuck and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Flood plains
Parent material: Alluvium
Slope range: 0 to 8 percent
Elevation: 10 to 50 feet
Mean annual precipitation: 38 to 60 inches

Mean annual air temperature: 51 to 53 degrees F
Growing season: 200 to 220 days (28 degrees F)

Typical Profile

0 to 8 inches—very dark grayish brown loamy fine sand
8 to 12 inches—dark grayish brown loamy fine sand
12 to 36 inches—dark brown fine sand
36 to 60 inches—very dark grayish brown gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Frequency of flooding: Rare

Included Areas

• Soils that are wet
• Soils that have fine textured material throughout

Major Uses

Pastureland, homesites, cropland, recreation, wildlife habitat, woodland

Pastureland and Cropland

General management considerations:
• The low available water capacity is the main limitation.
• Many kinds of crops can be grown under irrigation.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• Because the soil is droughty, light and frequent applications of irrigation water are essential.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Apply enough water to wet the root zone but not so much that it leaches plant nutrients.
• Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
• Onsite sewage disposal systems may not be suitable because of the risk of polluting the ground water.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Reduce the risk of flooding by locating structures above the expected flood level.
• Stockpile topsoil and use it to reclaim areas disturbed during construction.
• Construct special retainer walls in shallow excavations to prevent cutbanks from caving in.
• Protect onsite sewage disposal systems from flooding.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, black cottonwood, bigleaf maple
Major understory species: Vine maple, salmonberry, western swordfern, western brackenfern, common snowberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• The type of equipment or time of year it can be used is not restricted on this unit.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.

• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4s

161—Pits

Description of areas: Open excavations from which soil material and underlying rounded gravel and stones or basalt have been removed
Vegetation: Little, if any
Uses of excavated material: Road construction, road ballast, gravel for concrete, protection of channels
Capability subclass: 8s

162—Polepatch loamy sand, overblown, 0 to 30 percent slopes

Composition

Polepatch, overblown, and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Fans, terraces
Parent material: Pyroclastic flow and lahar with a mantle of volcanic ash and pumice
Slope range: 0 to 30 percent
Elevation: 2,800 to 3,800 feet
Mean annual precipitation: 115 to 125 inches
Mean annual air temperature: 38 to 42 degrees F
Growing season: 90 to 120 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

0 to 7 inches—dark gray loamy sand
7 to 9 inches—very dark gray very cobbly loamy sand
9 to 12 inches—very dark grayish brown very cobbly loamy sand
12 to 60 inches—very dark brown extremely cobbly sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 30 percent
• Soils that are cobbly in the upper 7 inches
• Soils that are warmer
• Soils that are gravelly with fragments that are dominantly cinders
• Soils that have a loamy sand surface layer more than 7 inches thick

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Kinnikinnick, common beargrass, huckleberry, lupine, penstemon, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation to reduce soil displacement.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: None
Restrictions to planting: Gravel and cobbles in the soil; deposits of volcanic ash on surface

General management considerations:
• Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

163—Polepatch very cobbly loamy sand, 0 to 30 percent slopes

Composition

Polepatch and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Fans, terraces
Parent material: Pyroclastic flow and lahar with a mantle of volcanic ash and pumice
Slope range: 0 to 30 percent
Elevation: 2,800 to 3,800 feet
Mean annual precipitation: 115 to 125 inches
Mean annual air temperature: 38 to 42 degrees F
Growing season: 90 to 120 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

2 inches to 0—organic mat
0 to 5 inches—very dark gray and very dark grayish brown very cobbly loamy sand
5 to 60 inches—very dark brown extremely cobbly sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 30 percent
• Soils that have boulders on the surface
• Soils that are warmer
• Soils that are gravelly with fragments that are dominantly cinders
• Soils that have a loamy sand surface layer

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Western white pine, lodgepole pine, Pacific silver fir
Major understory species: Kinnikinnick, common beargrass, huckleberry, lupine, penstemon

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Equipment commonly is inoperable in winter because of the snowpack.

Silviculture

Potential for natural regeneration: Western hemlock—periodically
Restriction to planting: Gravel and cobbles in the soil
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6s

164—Polepatch very cobbly loamy sand, 50 to 90 percent slopes

Composition

Polepatch and similar soils—80 percent
Contrasting components—20 percent

Setting

Position on landscape: Terrace escarpments
Parent material: Pyroclastic flow and lahar with a mantle of volcanic ash and pumice
Slope range: 50 to 90 percent
Elevation: 2,800 to 3,800 feet
Mean annual precipitation: 115 to 125 inches
Mean annual air temperature: 38 to 42 degrees F
Growing season: 90 to 120 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

2 inches to 0—organic mat
0 to 5 inches—very dark gray and very dark grayish brown very cobbly loamy sand
5 to 60 inches—very dark brown extremely cobbly sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 50 percent
- Soils that have boulders on the surface
- Soils that are warmer
- Soils that are gravelly with fragments that are dominantly cinders
- Soils that have a loamy sand surface layer
- Rock outcrop

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Western white pine, lodgepole pine, Pacific silver fir
Major understory species: Kinnikinnick, common beargrass, huckleberry, lupine, penstemon

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil erosion can be minimized by using appropriate cable yarding systems.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—periodically
Restriction to planting: Gravel and cobbles in the soil
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

165—Polepatch extremely bouldery loamy sand, 0 to 30 percent slopes

Composition

Polepatch and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Fans, terraces
Parent material: Pyroclastic flow and lahar with a mantle of volcanic ash and pumice
Slope range: 0 to 30 percent
Elevation: 2,800 to 3,800 feet
Mean annual precipitation: 115 to 125 inches
Mean annual air temperature: 38 to 42 degrees F
Growing season: 90 to 120 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

2 inches to 0—organic mat
0 to 5 inches—very dark gray and very dark grayish brown extremely bouldery loamy sand
5 to 60 inches—very dark brown extremely cobbly sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 30 percent
- Soils that have cobbles on the surface
- Soils that are warmer
- Soils that are gravelly with fragments that are dominantly cinders
- Soils that have a loamy sand surface layer

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Western white pine, lodgepole pine, Pacific silver fir
Major understory species: Kinnikinnick, common beargrass, huckleberry, lupine, penstemon

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- Avoiding boulders on the surface forces yarding or skidding paths to converge, which increases soil erosion.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock—periodically
Restriction to planting: Cobbles and boulders in the soil
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6s

166—Prather silty clay loam, 0 to 5 percent slopes

Composition

Prather and similar soils—70 percent
Contrasting soils—30 percent

Setting

Position on landscape: Terraces, till plains
Parent material: Glacial drift
Slope range: 0 to 5 percent
Elevation: 200 to 600 feet

Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 13 inches—very dark grayish brown and dark brown silty clay loam
13 to 43 inches—dark brown silty clay
43 to 60 inches—yellowish brown clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—1.5 to 3.0 feet; months—November through April
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 5 percent
- Soils that are somewhat poorly drained
- Soils that are poorly drained
- Soils that are well drained
- Soils that have gravel at a depth of less than 36 inches

Major Uses

Cropland, woodland, pastureland, wildlife habitat, recreation, homesites

Pastureland and Cropland

General management considerations:
- The seasonal high water table is the main limitation.
- Grasses and legumes grow well if they are adequately fertilized.
- The most suitable irrigation method is a sprinkler system.
- Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
- Drainage should be maintained.

Suitable management practices:
- Provide supplemental irrigation in years of limited precipitation.
- Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Vine maple, cascade Oregongrape, trailing blackberry, salal, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Building Site Development

General management considerations:
- Septic tank absorption fields may function poorly because of the seasonal wetness and slow permeability, which restrict the movement and filtration of the effluent.
- If the density of housing is moderate or high, a community sewage system may be needed.

Suitable management practices:
- Reduce wetness by providing drainage around buildings with basements and crawl spaces and installing drain tile around footings.
- Prevent structural damage that results from shrinking and swelling by properly designing and building foundations, concrete structures, and paved areas and by backfilling with material that has low shrink-swell potential.

• Use additional absorption lines and sandy backfill for the trench to compensate for the slow permeability.
• Stabilize disturbed areas to reduce the risk of erosion and the maintenance cost resulting from erosion.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 3w

167—Prather silty clay loam, 5 to 15 percent slopes

Composition

Prather and similar soils—70 percent
Contrasting soils—30 percent

Setting

Position on landscape: Terraces, till plains
Parent material: Glacial drift
Slope range: 5 to 15 percent
Elevation: 200 to 600 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 13 inches—very dark grayish brown and dark brown silty clay loam
13 to 43 inches—dark brown silty clay
43 to 60 inches—yellowish brown clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Seasonal high water table: Kind—perched; depth—1.5 to 3.0 feet; months—November through April
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 15 percent
• Soils that are somewhat poorly drained
• Soils that are poorly drained
• Soils that are well drained
• Soils that have gravel at a depth of less than 36 inches

Major Uses

Cropland, woodland, pastureland, wildlife habitat, recreation, homesites

Pastureland and Cropland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Vine maple, cascade Oregongrape, trailing blackberry, salal, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Building Site Development

General management considerations:
• Septic tank absorption fields may function poorly because of the steepness of slope, seasonal wetness, and slow permeability, which restrict the movement and filtration of the effluent.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Reduce wetness by providing drainage around buildings with basements and crawl spaces and installing drain tile around footings.
• Preserve the existing plant cover during construction to reduce the risk of erosion.
• Use temporary sediment or debris basins to reduce the loss of soil material from construction sites.
• Prevent structural damage that results from shrinking and swelling by designing foundations and footings to allow for shrinking and swelling, diverting runoff away from buildings, and backfilling with material that has low shrink-swell potential.
• Because slope is a concern in installing septic tank absorption fields, install absorption lines on the contour.
• Use additional absorption lines and sandy backfill for the trench to compensate for the slow permeability.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.
• Either provide drainage or select plants that tolerate seasonal wetness.

Interpretive Groups

Capability subclass: 3e

168—Raught silt loam, 20 to 30 percent slopes

Composition

Raught and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes, mountainslopes
Parent material: Residuum and colluvium derived from basalt with an admixture of loess and volcanic ash
Slope range: 20 to 30 percent
Elevation: 200 to 1,500 feet
Mean annual precipitation: 50 to 70 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 11 inches—dark reddish brown silt loam
11 to 21 inches—dark reddish brown silt loam
21 to 60 inches—dark reddish brown silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 20 percent or more than 30 percent
• Soils that are gravelly throughout
• Soils that have bedrock at a depth of 40 to 60 inches

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Salmonberry, salal, cascade Oregongrape, vine maple, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily; western hemlock—periodically
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

169—Raught silt loam, 30 to 65 percent slopes

Composition

Raught and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes, mountainslopes
Parent material: Residuum and colluvium derived from basalt with an admixture of loess and volcanic ash
Slope range: 30 to 65 percent
Elevation: 200 to 1,500 feet
Mean annual precipitation: 50 to 70 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 11 inches—dark reddish brown silt loam
11 to 21 inches—dark reddish brown silt loam
21 to 60 inches—dark reddish brown silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are gravelly throughout
• Soils that have bedrock at a depth of 40 to 60 inches

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Salmonberry, salal, cascade Oregongrape, vine maple, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily; western hemlock—periodically
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

170—Raught silt loam, 65 to 90 percent slopes

Composition

Raught and similar soils—70 percent
Contrasting soils—30 percent

Setting

Position on landscape: Hillslopes, mountainslopes
Parent material: Residuum and colluvium derived from basalt with an admixture of loess and volcanic ash
Slope range: 65 to 90 percent
Elevation: 200 to 1,500 feet
Mean annual precipitation: 50 to 70 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 11 inches—dark reddish brown silt loam
11 to 21 inches—dark reddish brown silt loam
21 to 60 inches—dark reddish brown silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 65 percent
• Soils that are gravelly throughout
• Soils that have bedrock at a depth of 40 to 60 inches

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, bigleaf maple
Major understory species: Salmonberry, salal, cascade Oregongrape, vine maple, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily; western hemlock—periodically
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

171—Reichel silt loam, 5 to 30 percent slopes

Composition

Reichel and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite with a mantle of volcanic ash
Slope range: 5 to 30 percent
Elevation: 2,600 to 3,200 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 39 to 43 degrees F
Growing season: 140 to 160 days (28 degrees F)
Periods of snowpack: January through March

Typical Profile

3 inches to 0—organic mat
0 to 19 inches—very dark brown and very dark grayish brown silt loam
19 to 47 inches—dark yellowish brown gravelly loam
47 to 53 inches—dark yellowish brown very cobbly loam
53 inches—fractured andesite

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
• Soils that are warmer
• Soils that are less than 15 percent gravel throughout
• Soils that are wet

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, noble fir, Pacific silver fir
Minor tree species: Western redcedar, Douglas fir, Alaska cedar
Major understory species: Red huckleberry, cascade Oregongrape, western brackenfern, prince's pine, common beargrass

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

172—Riverwash

Composition

Riverwash and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Active river bottoms
Parent material: Alluvium

Slope range: 0 to 2 percent
Elevation: 10 to 2,500 feet
Mean annual precipitation: 40 to 110 inches
Mean annual air temperature: 46 to 50 degrees F
Growing season: 140 to 225 days (28 degrees F)

Typical Profile

0 to 6 inches—gravelly sand
6 to 60 inches—stratified gravelly sand to extremely gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained to somewhat excessively drained
Permeability: Rapid or very rapid
Available water capacity: Low to high
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Severe
Seasonal high water table: Kind—apparent; depth—at the surface to a depth of 24 inches below the surface; months—January to December
Hazard of flooding: Frequency—frequent; duration—very long; months—October through July

Included Areas

- Soils that are subject to occasional flooding

Major Uses

Wildlife habitat, recreation

Interpretive Groups

Capability subclass: 8w

173—Rock outcrop-Rubble land complex

Composition

Rock outcrop: 60 percent
Rubble land: 40 percent

Setting

Position on landscape: Mountainslopes
Parent material: Basalt, andesite
Slope range: 50 to 100 percent
Elevation: 2,000 to 4,500 feet
Mean annual precipitation: 70 to 120 inches
Mean annual air temperature: 41 to 45 degrees F
Growing season: 70 to 90 days (28 degrees F)

Rock Outcrop

Description of areas: Cliffs, bare peaks, lava flows

Rubble Land

Description of areas: Fragmental rock, including cobbles, stones, and boulders

Major Use

Aesthetic value

Interpretive Groups

Capability subclass: 8s

174—Rose Valley silt loam, 0 to 8 percent slopes

Composition

Rose Valley and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces
Parent material: Old alluvium derived from basic igneous rock
Slope range: 0 to 8 percent
Elevation: 40 to 300 feet
Mean annual precipitation: 45 to 55 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 11 inches—very dark grayish brown silt loam
11 to 18 inches—mottled, dark brown and light gray silt loam
18 to 51 inches—mottled, strong brown, grayish brown, and yellowish brown silty clay loam
51 to 75 inches—gray clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—1 to 2 feet; months—December through April
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 8 percent
- Soils that are poorly drained
- Soils that are moderately well drained
- Soils that are silty clay loam in the upper 11 inches

Major Uses

Woodland, pastureland, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Vine maple, Douglas spirea, cascara buckthorn, willow, evergreen blackberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland

General management considerations:
• A seasonal high water table is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• Wetness limits the choice of plants, the period of grazing, and the production of deep-rooted crops.
• Maintaining drainage is difficult because of the lack of suitable outlets.
• A tillage pan forms easily if the soil is tilled when wet.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
• Select plants that tolerate wetness or maintain drainage.
• Maintain open ditches or tile drains to remove water on or near the surface.
• Irrigate at a rate to prevent the buildup of a high water table.
• Apply water at a slow rate over a long period to ensure that the root zone is properly wetted.
• Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
• Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Interpretive Groups

Capability subclass: 4w

175—Rose Valley silt loam, 8 to 15 percent slopes

Composition

Rose Valley and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces
Parent material: Old alluvium derived from basic igneous rock
Slope range: 8 to 15 percent
Elevation: 40 to 300 feet
Mean annual precipitation: 45 to 55 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

0 to 11 inches—very dark grayish brown silt loam
11 to 18 inches—mottled, dark brown and light gray silt loam
18 to 51 inches—mottled, strong brown, grayish brown, and yellowish brown silty clay loam
51 to 75 inches—gray clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—1 to 2 feet; months—December from April
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 8 percent or more than 15 percent
- Soils that are moderately well drained
- Soils that are silty clay loam in the upper 14 inches

Major Uses

Woodland, pastureland, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Vine maple, Douglas spirea, cascara buckthorn, willow, evergreen blackberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland

General management considerations:
- A seasonal high water table is the main limitation.
- Grasses and legumes grow well if they are adequately fertilized.
- Supplemental irrigation is needed for crops.
- The most suitable irrigation method is a sprinkler system.
- Wetness limits the choice of plants, the period of grazing, and the production of deep-rooted crops.
- Maintaining drainage is difficult because of the lack of suitable outlets.
- A tillage pan forms easily if the soil is tilled when wet.
- Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Either select plants that tolerate wetness or maintain drainage.
- Maintain tile drains to reduce wetness if a suitable outlet is available.
- Maintain open ditches or tile drains to remove water on or near the surface.
- Irrigate at a rate to prevent the buildup of a high water table.
- Apply water at a slow rate over a long period to ensure that the root zone is properly wetted.
- Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
- Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
- Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
- Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
- Reduce the risk of erosion by seeding on the contour or across the slope.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Interpretive Groups

Capability subclass: 4w

176—Salkum silt loam, 2 to 8 percent slopes

Composition

Salkum and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Terraces, hills
Parent material: Glacial drift
Slope range: 2 to 8 percent
Elevation: 200 to 600 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

0 to 12 inches—dark brown and brown silt loam
12 to 45 inches—reddish brown and yellowish red silty clay
45 to 60 inches—mixed reddish brown, yellow, and white silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 2 percent or more than 8 percent
- Soils that are moderately well drained
- Soils that are derived from siltstone or sandstone
- Soils that are wet

Major Uses

Cropland, woodland, pastureland, homesites, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, grand fir, bigleaf maple, western redcedar, bitter cherry
Major understory species: Trailing blackberry, vine maple, salal, cascade Oregongrape, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
- Grasses and legumes grow well if they are adequately fertilized.
- Supplemental irrigation is needed for crops.
- The most suitable irrigation method is a sprinkler system.
- A tillage pan forms easily if the soil is tilled when wet.
- Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Provide supplemental irrigation in years of limited precipitation.
- Irrigate at a rate that ensures optimum production but does not increase deep percolation, runoff, and erosion.
- Apply water at a slow rate over a long period to ensure that the root zone is properly wetted.
- Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
- Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.

• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
• Septic tank absorption fields may function poorly because of the moderately slow permeability, which restricts the movement and filtration of the effluent.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Use temporary sediment or debris basins to reduce the loss of soil material from construction sites.
• Preserve the existing plant cover during construction to reduce the risk of erosion.
• Compensate for the moderately slow permeability by increasing the size of the absorption field and backfilling trenches with porous material.
• Preserve as many trees as possible.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 2e

177—Salkum silt loam, 8 to 20 percent slopes

Composition

Salkum and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Terraces, hills
Parent material: Glacial drift
Slope range: 8 to 20 percent
Elevation: 200 to 600 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

0 to 12 inches—dark brown and brown silt loam
12 to 45 inches—reddish brown and yellowish red silty clay
45 to 60 inches—mixed reddish brown, yellow, and white silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 8 percent or more than 20 percent
• Soils that are moderately well drained
• Soils that are derived from siltstone or sandstone
• Soils that are wet

Major Uses

Cropland, woodland, pastureland, wildlife habitat, recreation

Pastureland and Cropland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder

Minor tree species: Western hemlock, grand fir, bigleaf maple, western redcedar, bitter cherry
Major understory species: Trailing blackberry, vine maple, salal, cascade Oregongrape, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 3e

178—Salkum silt loam, 20 to 30 percent slopes

Composition

Salkum and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Terraces, hills
Parent material: Glacial drift
Slope range: 20 to 30 percent
Elevation: 200 to 600 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 175 to 240 days (28 degrees F)

Typical Profile

0 to 12 inches—dark brown and brown silt loam
12 to 45 inches—reddish brown and yellowish red silty clay
45 to 60 inches—mixed reddish brown, yellow, and white silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 20 percent or more than 30 percent
• Soils that are moderately well drained
• Soils that are derived from siltstone or sandstone

Major Uses

Pastureland, woodland, wildlife habitat, recreation

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder

Minor tree species: Western hemlock, grand fir, bigleaf maple, western redcedar, bitter cherry
Major understory species: Trailing blackberry, vine maple, salal, cascade Oregongrape, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

179—Sara silt loam, 0 to 8 percent slopes

Composition

Sara and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces
Parent material: Old alluvium derived from tuffaceous siltstone and sandstone
Slope range: 0 to 8 percent
Elevation: 250 to 450 feet
Mean annual precipitation: 45 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 175 to 200 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 11 inches—dark brown silt loam
11 to 35 inches—dark brown and brown silty clay loam
35 to 60 inches—brown silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—1 to 2 feet; months—December through April
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 8 percent
• Soils that are well drained
• Soils that are somewhat poorly drained
• Soils that are silty clay loam in the upper 11 inches

Major Uses

Cropland, woodland, pastureland, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, bigleaf maple
Major understory species: Salal, cascade Oregongrape, vine maple, salmonberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily

Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
• A seasonal high water table is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• Wetness limits the choice of plants, the period of grazing, and the production of deep-rooted crops.
• A tillage pan forms easily if the soil is tilled when wet.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide irrigation and maintain drainage if management is intensive.
• Provide supplemental irrigation in years of limited precipitation.
• Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Interpretive Groups

Capability subclass: 4w

180—Sara silt loam, 8 to 15 percent slopes

Composition

Sara and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces
Parent material: Old alluvium derived from tuffaceous siltstone and sandstone
Slope range: 8 to 15 percent
Elevation: 250 to 450 feet
Mean annual precipitation: 45 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 175 to 200 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 11 inches—dark brown silt loam
11 to 35 inches—dark brown and brown silty clay loam
35 to 60 inches—brown silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Seasonal high water table: Kind—perched; depth—1 to 2 feet; months—December through April
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 8 percent or more than 15 percent
• Soils that are well drained
• Soils that are somewhat poorly drained
• Soils that are silty clay loam in the upper 11 inches
• Soils that are wet

Major Uses

Cropland, woodland, pastureland, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, bigleaf maple
Major understory species: Salal, cascade Oregongrape, vine maple, salmonberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
• A seasonal high water table and steepness of slope are the main limitations.
• Grasses and legumes grow well if they are adequately fertilized.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• Wetness limits the choice of plants, the period of grazing, and the production of deep-rooted crops.
• A tillage pan forms easily if the soil is tilled when wet.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Reduce the risk of erosion by farming across the slope, fertilizing, and maintaining the organic matter content.
• Maintain the quality and quantity of forage by adjusting the stocking rate, especially on the steeper slopes; rotating grazing; mowing and harrowing to spread livestock droppings; controlling weeds; and applying fertilizer annually.

Interpretive Groups

Capability subclass: 4w

181—Sara silt loam, 15 to 40 percent slopes

Composition

Sara and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces, terrace escarpments
Parent material: Old alluvium derived from tuffaceous siltstone and sandstone
Slope range: 15 to 40 percent
Elevation: 250 to 450 feet
Mean annual precipitation: 45 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 175 to 200 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 11 inches—dark brown silt loam
11 to 35 inches—dark brown and brown silty clay loam
35 to 60 inches—brown silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Seasonal high water table: Kind—perched; depth—1 to 2 feet; months—December through April
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 15 percent
• Soils that are well drained
• Soils that are somewhat poorly drained
• Soils that are silty clay loam in the upper 11 inches
• Soils that are wet

Major Uses

Pastureland, woodland, wildlife habitat

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.

• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, bigleaf maple
Major understory species: Salal, cascade Oregongrape, vine maple, salmonberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

182—Sara silty clay loam, 0 to 8 percent slopes

Composition

Sara and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces
Parent material: Old alluvium derived from tuffaceous siltstone and sandstone
Slope range: 0 to 8 percent
Elevation: 250 to 450 feet
Mean annual precipitation: 45 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 175 to 200 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 11 inches—dark brown silty clay loam
11 to 35 inches—brown silty clay loam
35 to 60 inches—brown silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—1 to 2 feet; months—December through April
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 8 percent
• Soils that are well drained
• Soils that are somewhat poorly drained
• Soils that are silt loam in the upper 11 inches
• Soils that are wet

Major Uses

Cropland, woodland, pastureland, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, bigleaf maple
Major understory species: Salal, cascade Oregongrape, vine maple, salmonberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
• Most climatically adapted crops can be grown.
• Grasses and legumes grow well if they are adequately fertilized.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• A tillage pan forms if the soil is excessively cultivated.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
• Increase the water intake rate by growing cover crops, returning crop residue to the soil, rotating crops, and keeping tillage at a minimum.
• Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures; rotating crops; and growing cover crops.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Maintain tilth by returning crop residue to the soil, using a cropping system that includes grasses, legumes, or grass-legume mixtures; rotating crops; growing cover crops; and keeping tillage at a minimum.
• Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Interpretive Groups

Capability subclass: 4w

183—Sarazan very gravelly silt loam, 5 to 30 percent slopes

Composition

Sarazan and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Ridgetops, mountainslopes
Parent material: Residuum and colluvium derived from breccia with an admixture of volcanic ash and loess
Slope range: 5 to 30 percent
Elevation: 1,600 to 2,800 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 140 to 190 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through March

Typical Profile

3 inches to 0—organic mat
0 to 9 inches—dark reddish brown very gravelly silt loam
9 to 31 inches—reddish brown and yellowish red very gravelly silt loam
31 to 50 inches—yellowish red extremely gravelly silt loam
50 inches—highly fractured basaltic breccia

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate

Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that are less than 35 percent rock fragments throughout
• Soils that have bedrock at a depth of 20 to 40 inches
• Soils that are finer textured throughout
• Soils that have weathered tuff or tuffaceous breccia
• Soils that are warmer

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Western redcedar, red alder
Major understory species: Vine maple, salal, cascade Oregongrape, trailing blackberry, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

184—Sarazan very gravelly silt loam, 30 to 65 percent slopes

Composition

Sarazan and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Ridgetops, mountainslopes
Parent material: Residuum and colluvium derived from breccia with an admixture of volcanic ash and loess
Slope range: 30 to 65 percent
Elevation: 1,600 to 2,800 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 140 to 190 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through March

Typical Profile

3 inches to 0—organic mat
0 to 9 inches—dark reddish brown very gravelly silt loam
9 to 31 inches—reddish brown and yellowish red very gravelly silt loam
31 to 50 inches—yellowish red extremely gravelly silt loam
50 inches—highly fractured basaltic breccia

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are less than 35 percent rock fragments throughout
• Soils that have bedrock at a depth of 20 to 40 inches
• Soils that are finer textured throughout

- Soils that have weathered tuff or tuffaceous breccia
- Soils that are warmer

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Western redcedar, red alder
Major understory species: Vine maple, salal, cascade Oregongrape, trailing blackberry, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil erosion can be minimized by using appropriate cable yarding systems.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

185—Sauvola loam, 0 to 8 percent slopes

Composition

Sauvola and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Upland terraces, hillslopes
Parent material: Residuum derived from siltstone and old alluvium
Slope range: 0 to 8 percent
Elevation: 150 to 900 feet
Mean annual precipitation: 45 to 55 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 175 to 225 days (28 degrees F)

Typical Profile

0 to 15 inches—dark brown loam
15 to 27 inches—brown silt loam
27 to 51 inches—brown and strong brown silty clay loam
51 to 60 inches—mixed dark yellowish brown, yellowish brown, and light brownish gray silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—1.5 to 3.5 feet; months—December through March
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 8 percent
- Soils that are poorly drained or somewhat poorly drained
- Soils that have pebbles or sand at a depth of less than 36 inches
- Soils that have coarser textures

Major Uses

Cropland, woodland, wildlife habitat, pastureland, homesites, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, bigleaf maple, grand fir
Major understory species: Vine maple, western swordfern, cascade Oregongrape, red huckleberry, rose

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
• A seasonal high water table is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• Wetness limits the choice of plants, the period of grazing, and the production of deep-rooted crops.
• A tillage pan forms easily if the soil is tilled when wet.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide irrigation and maintain drainage if management is intensive.
• Provide supplemental irrigation in years of limited precipitation.
• Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Maintain tilth by returning crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
• Septic tank absorption fields may function poorly because of the seasonal wetness and moderately slow permeability, which restrict the movement and filtration of the effluent.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Reduce wetness by providing drainage around buildings with basements and crawl spaces and installing drain tile around footings.
• Prevent structural damage that results from shrinking and swelling by properly designing and building foundations, concrete structures, and paved areas and by backfilling with material that has low shrink-swell potential.
• Use additional absorption lines and sandy backfill for the trench to compensate for the moderately slow permeability.
• Stabilize disturbed areas to reduce the risk of erosion and the maintenance cost resulting from erosion.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 3w

186—Sauvola loam, 8 to 15 percent slopes

Composition

Sauvola and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Upland terraces, hillslopes
Parent material: Residuum derived from siltstone and old alluvium

Slope range: 8 to 15 percent
Elevation: 150 to 900 feet
Mean annual precipitation: 45 to 55 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 175 to 225 days (28 degrees F)

Typical Profile

0 to 15 inches—dark brown loam
15 to 27 inches—dark yellowish brown silt loam
27 to 51 inches—brown and strong brown silty clay loam
51 to 60 inches—mixed dark yellowish brown, yellowish brown, and light brownish gray silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—1.5 to 3.5 feet; months—December through March
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 8 percent or more than 15 percent
• Soils that are poorly drained
• Soils that are somewhat poorly drained
• Soils that have pebbles or sand at a depth of less than 36 inches
• Soils that have coarser textures

Major Uses

Cropland, woodland, wildlife habitat, pastureland, homesites, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, bigleaf maple, grand fir
Major understory species: Vine maple, western swordfern, cascade Oregongrape, red huckleberry, rose

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
• Septic tank absorption fields may function poorly because of the steepness of slope, seasonal wetness, and moderately slow permeability, which restrict the movement and filtration of the effluent.
• If the density of housing is moderate or high, a community sewage system may be needed.

Suitable management practices:
• Design and construct buildings and access roads to compensate for the steepness of slope.
• Reduce wetness by providing drainage around buildings with basements and crawl spaces and by installing drain tile around footings.
• Preserve the existing plant cover during construction to reduce the risk of erosion.
• Use temporary sediment or debris basins to reduce the loss of soil material from construction sites.
• Prevent structural damage that results from shrinking and swelling by designing foundations and footings to allow for shrinking and swelling, by diverting runoff away from buildings, and by backfilling with material that has low shrink-swell potential.
• Because slope is a concern in installing septic tank absorption fields, install absorption lines on the contour.
• Use additional absorption lines and sandy backfill for the trench to compensate for the moderately slow permeability.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.
• Either provide drainage or select plants that tolerate a seasonal high water table.

Interpretive Groups

Capability subclass: 3e

187—Sauvola loam, 15 to 30 percent slopes

Composition

Sauvola and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Upland terraces, hillslopes
Parent material: Residuum derived from siltstone and old alluvium
Slope range: 15 to 30 percent
Elevation: 150 to 900 feet
Mean annual precipitation: 45 to 55 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 175 to 225 days (28 degrees F)

Typical Profile

0 to 15 inches—dark brown loam
15 to 27 inches—dark yellowish brown silt loam
27 to 51 inches—brown and strong brown silty clay loam
51 to 60 inches—mixed dark yellowish brown, yellowish brown, and light brownish gray silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—1.5 to 3.5 feet; months—December through March
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 15 percent or more than 30 percent
• Soils that are poorly drained
• Soils that are somewhat poorly drained
• Soils that have pebbles or sand at a depth of less than 36 inches
• Soils that have coarser textures

Major Uses

Pastureland, woodland, wildlife habitat, watershed

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, bigleaf maple, grand fir
Major understory species: Vine maple, western

swordfern, cascade Oregongrape, red huckleberry, rose

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

188—Schneider very gravelly loam, 5 to 30 percent slopes

Composition

Schneider and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Hillslopes, mountainslopes
Parent material: Residuum and colluvium derived from andesite and andesitic breccia
Slope range: 5 to 30 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 50 to 75 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 160 to 190 days (28 degrees F)

Typical Profile

1 inch to 0—organic mat
0 to 12 inches—dark reddish brown very gravelly loam
12 to 28 inches—dark brown extremely gravelly loam
28 to 45 inches—reddish brown extremely gravelly loam
45 inches—fractured andesite

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that are less than 35 percent rock fragments throughout
• Soils that have bedrock at a depth of less than 40 inches or more than 60 inches

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, western swordfern, western brackenfern, salal, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• Neither the type of equipment nor the time of year equipment can be used is restricted on this unit.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface

insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: Gravel and cobbles in the soil
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

189—Schneider very gravelly loam, 30 to 65 percent slopes

Composition

Schneider and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Hillslopes, mountainslopes
Parent material: Residuum and colluvium derived from andesite and andesitic breccia
Slope range: 30 to 65 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 50 to 75 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 160 to 190 days (28 degrees F)

Typical Profile

1 inch to 0—organic mat
0 to 12 inches—dark reddish brown very gravelly loam
12 to 28 inches—dark brown extremely gravelly loam
28 to 45 inches—reddish brown extremely gravelly loam
45 inches—fractured andesite

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are less than 35 percent rock fragments throughout
• Soils that have bedrock at a depth of less than 40 inches or more than 60 inches

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, western swordfern, western brackenfern, salal, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: Gravel and cobbles in the soil

General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

190—Schneider-Rock outcrop complex, 15 to 65 percent slopes

Composition

Schneider and similar soils—55 percent
Rock outcrop—30 percent
Contrasting soils—15 percent

Setting

Position on landscape: Hillslopes, mountainslopes
Parent material: Residuum and colluvium derived from andesite, basalt, and volcanic breccia
Slope range: 15 to 65 percent
Elevation: 300 to 1,000 feet
Mean annual precipitation: 50 to 75 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 160 to 190 days (28 degrees F)

Schneider

Typical profile

1 inch to 0—organic mat
0 to 12 inches—dark reddish brown very gravelly loam
12 to 28 inches—dark brown extremely gravelly loam
28 to 45 inches—reddish brown extremely gravelly loam
45 inches—fractured andesite

Soil properties and qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite or basalt

Included Areas

• Soils that have slopes of less than 15 percent or more than 65 percent
• Soils that are less than 35 percent pebbles throughout
• Soils that are cobbly throughout
• Soils that have compact glacial till at a depth of 40 to 60 inches
• Soils that have bedrock at a depth of less than 40 inches

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, western swordfern, western brackenfern, salal, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion on slopes of more than 30 percent; cable yarding systems—suitable

Equipment use

• Soil erosion can be minimized on slopes of more than 30 percent by using appropriate cable yarding systems.
• Neither the type of equipment nor the time of year equipment can be used is restricted in areas of this unit that have slopes of less than 30 percent.
• Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases soil erosion.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.

• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: Gravel and cobbles in the soil, Rock outcrop
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Schneider—7e; Rock outcrop—8s

191—Schneider-Rock outcrop complex, 65 to 90 percent slopes

Composition

Schneider and similar soils—60 percent
Rock outcrop—25 percent
Contrasting soils—15 percent

Setting

Position on landscape: Hillslopes, mountainslopes
Parent material: Residuum and colluvium derived from andesite, basalt, and volcanic breccia
Slope range: 65 to 90 percent
Elevation: 300 to 1,000 feet
Mean annual precipitation: 50 to 75 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 160 to 190 days (28 degrees F)

Schneider

Typical profile

1 inch to 0—organic mat
0 to 12 inches—dark reddish brown very gravelly loam
12 to 28 inches—dark brown extremely gravelly loam
28 to 45 inches—reddish brown extremely gravelly loam
45 inches—fractured andesite

Soil properties and qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite or basalt

Included Areas

• Soils that have slopes of less than 65 percent
• Soils that are less than 35 percent pebbles throughout
• Soils that are cobbly throughout
• Soils that have compact glacial till at a depth of 40 to 60 inches
• Soils that have bedrock at a depth of less than 40 inches

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Cascade Oregongrape, western swordfern, western brackenfern, salal, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil erosion can be minimized by using appropriate cable yarding systems.
• Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil compaction and erosion.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they

require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: Gravel and cobbles in the soil, Rock outcrop
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Schneider—7e; Rock outcrop—8s

192—Seaquest silt loam, 0 to 8 percent slopes

Composition

Seaquest and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces, hills
Parent material: Old alluvium and sediment derived from tuffaceous siltstone, sandstone, conglomerate, and andesite
Slope range: 0 to 8 percent
Elevation: 400 to 700 feet
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 6 inches—dark brown silt loam
6 to 60 inches—strong brown, brown, and yellowish brown silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 8 percent
• Soils that are more than 5 percent rock fragments throughout
• Soils that are moderately well drained
• Soils that are silt loam throughout

Major Uses

Cropland, woodland, pastureland, homesites, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, bigleaf maple
Major understory species: Salmonberry, western swordfern, elderberry, vine maple, western hazel

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
• Grasses and legumes grow well if they are adequately fertilized.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• A tillage pan forms easily if the soil is tilled when wet.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.

• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Irrigate at a rate that ensures optimum production but does not increase deep percolation, runoff, and erosion.
• Apply water at a slow rate over a long period to ensure that the root zone is properly wetted.
• Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
• Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
• Septic tank absorption fields may function poorly because of the slow permeability, which restricts the movement and filtration of the effluent.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Use temporary sediment or debris basins to reduce the loss of soil material from construction sites.
• Preserve the existing plant cover during construction to reduce the risk of erosion.
• Prevent structural damage that results from shrinking and swelling by properly designing and building foundations, concrete structures, and paved areas.
• Compensate for the slow permeability by increasing the size of the absorption field and backfilling trenches with porous material.
• Preserve as many trees as possible.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 2e

193—Seaquest silt loam, 8 to 20 percent slopes

Composition

Seaquest and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces, hills
Parent material: Old alluvium and sediment derived from tuffaceous siltstone, sandstone, conglomerate, and andesite
Slope range: 8 to 20 percent
Elevation: 400 to 700 feet
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 6 inches—dark brown silt loam
6 to 60 inches—strong brown, brown, and yellowish brown silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 8 percent or more than 20 percent
• Soils that are more than 5 percent rock fragments throughout
• Soils that are moderately well drained
• Soils that are silt loam throughout

Major Uses

Cropland, woodland, pastureland, homesites, wildlife habitat

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, bigleaf maple
Major understory species: Salmonberry, western swordfern, elderberry, vine maple, western hazel

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland and Cropland

General management considerations:
- Steepness of slope is the main limitation.
- Grasses and legumes grow well if they are adequately fertilized.
- Supplemental irrigation is needed for crops.
- The most suitable irrigation method is a sprinkler system.
- A tillage pan forms easily if the soil is tilled when wet.
- Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Provide supplemental irrigation in years of limited precipitation.
- Irrigate at a rate that ensures optimum production but does not increase deep percolation, runoff, and erosion.
- Apply water at a slow rate over a long period to ensure that the root zone is properly wetted.
- Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
- Maintain or improve fertility and maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
- Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
- Reduce the risk of erosion by farming across the slope, fertilizing, and seeding on the contour or across the slope.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
- Septic tank absorption fields may function poorly because of the slow permeability and steepness of slope.
- If the density of housing is moderate or high, a community sewage system may be needed.

Suitable management practices:
- Use temporary sediment or debris basins to reduce the loss of soil material from construction sites.
- In steeper areas, reduce the risk of erosion by disturbing only the part of the site that is used for construction.
- Prevent structural damage that results from shrinking and swelling by designing foundations and footings to allow for shrinking and swelling, diverting runoff away from buildings, and backfilling with material that has low shrink-swell potential.
- Because slope is a concern in installing septic tank absorption fields, install absorption lines on the contour.
- Increase the size of the absorption area to compensate for the slow permeability.
- Use additional absorption lines and sandy backfill for the trench to compensate for the slow permeability.
- Install culverts to carry seasonal runoff where roads cross natural drainageways.
- Reduce the risk of erosion on steep cuts and fills by establishing a plant cover.
- Preserve as many trees as possible.
- Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
- Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 3e

194—Seaquest silt loam, 20 to 30 percent slopes

Composition

Seaquest and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hills, terraces
Parent material: Old alluvium and sediment derived from tuffaceous siltstone, sandstone, conglomerate, and andesite
Slope range: 20 to 30 percent
Elevation: 400 to 700 feet
Mean annual precipitation: 50 to 60 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 6 inches—dark brown silt loam
6 to 60 inches—strong brown, brown, and yellowish brown silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 20 percent or more than 30 percent
- Soils that are more than 5 percent rock fragments throughout
- Soils that are moderately well drained
- Soils that are silt loam throughout

Major Uses

Pastureland, woodland, wildlife habitat

Pastureland

General management considerations:
- Steepness of slope is the main limitation.
- Grasses and legumes grow well if they are adequately fertilized.
- The most suitable irrigation method is a sprinkler system.
- Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Provide supplemental irrigation in years of limited precipitation.
- Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western redcedar, bigleaf maple
Major understory species: Salmonberry, western swordfern, elderberry, vine maple, western hazel

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

195—Semiahmoo muck, 0 to 1 percent slopes

Composition

Semiahmoo and similar soils—90 percent
Contrasting soils—10 percent

Setting

Position on landscape: Depressional areas, flood plains
Parent material: Herbaceous organic deposits
Slope range: 0 to 1 percent
Elevation: 10 to 1,000 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 15 inches—dark brown muck
15 to 46 inches—very dark gray muck
46 to 60 inches—dark brown silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: Water-tolerant plants—60 inches or more
Runoff: Ponded
Hazard of water erosion: None
Seasonal high water table: Kind—apparent; depth—ponded 1 foot above the surface to the surface; months—November through May
Hazard of flooding: None

Included Areas

• Soils that have mineral soil material at a depth of less than 55 inches

Major Use

Wetland wildlife habitat

Interpretive Groups

Capability subclass: 5w

196—Siouxon very cobbly silt loam, 5 to 30 percent slopes

Composition

Siouxon and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite with an admixture of volcanic ash
Slope range: 5 to 30 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 60 to 80 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 175 to 200 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 14 inches—very dark brown very cobbly silt loam
14 to 28 inches—dark brown very cobbly loam
28 to 55 inches—brown and dark yellowish brown extremely cobbly loam
55 inches—fractured andesite

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
• Soils that are colder

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Vine maple, western swordfern, salal, western brackenfern, thimbleberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• Neither the type of equipment nor the time of year equipment can be used is restricted on this unit.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: Cobbles in the soil
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6s

197—Siouxon very cobbly silt loam, 30 to 65 percent slopes

Composition

Siouxon and similar soils—80 percent
Contrasting components—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite with an admixture of volcanic ash
Slope range: 30 to 65 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 60 to 80 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 175 to 200 days (28 degrees F)

Typical Profile

3 inches to 0—organic mat
0 to 14 inches—very dark brown very cobbly silt loam
14 to 28 inches—dark brown very cobbly loam
28 to 55 inches—brown and dark yellowish brown extremely cobbly loam
55 inches—fractured andesite

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
• Soils that are colder
• Rock outcrop

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Vine maple, western swordfern, salal, western brackenfern, thimbleberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: Cobbles in the soil
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

198—Siouxon-Rock outcrop complex, 65 to 90 percent slopes

Composition

Siouxon and similar soils—65 percent
Rock outcrop—20 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite with an admixture of volcanic ash
Slope range: 65 to 90 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 60 to 80 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 175 to 200 days (28 degrees F)

Siouxon

Typical profile

3 inches to 0—organic mat
0 to 14 inches—very dark brown very cobbly silt loam
14 to 28 inches—dark brown very cobbly loam
28 to 55 inches—brown and dark yellowish brown extremely cobbly loam
55 inches—fractured andesite

Soil properties and qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite or basalt

Included Areas

• Soils that have slopes of less than 65 percent
• Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
• Soils that are colder

Major Uses

Woodland, wildlife habitat, recreation, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Vine maple, western swordfern, salal, western brackenfern, thimbleberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil erosion can be minimized by using appropriate cable yarding systems.
• Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases soil erosion.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily

Restrictions to planting: Cobbles in the soil, Rock outcrop

General management considerations:

• Unwanted competing vegetation can be controlled by mechanical or chemical methods.

• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Siouxon—7e; Rock outcrop—8s

199—Snohomish silty clay loam, 0 to 1 percent slopes

Composition

Snohomish and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Flood plains
Parent material: Alluvium underlain by organic material
Slope range: 0 to 1 percent
Elevation: 10 to 550 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 7 inches—dark gray silty clay loam
7 to 18 inches—gray silty clay loam
18 to 40 inches—dark reddish brown and dark brown muck
40 to 60 inches—very dark grayish brown muck

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—apparent; depth—1 to 4 feet; months—November through May
Frequency of flooding: Rare

Included Areas

• Soils that are somewhat poorly drained
• Soils that are artificially drained
• Soils that do not have organic material in the substratum

Major Uses

Pastureland, cropland, woodland

Pastureland and Cropland

General management considerations:

• A seasonal high water table is the main limitation.

• Most climatically adapted crops can be grown if adequate drainage is maintained and protection from flooding is provided.

• Grasses and legumes grow well if they are adequately fertilized.

• Supplemental irrigation is needed for crops.

• The most suitable irrigation method is a sprinkler system.

• Wetness limits the period of grazing and the production of deep-rooted crops.

• A tillage pan forms easily if the soil is tilled when wet.

• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.

• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:

• Either select plants that tolerate wetness or maintain drainage.

• Seed only the hay and pasture plants that tolerate periodic inundation and seasonal wetness.

• Maintain open ditches or tile drains to remove water on or near the surface.

• Provide irrigation and maintain drainage if management is intensive.

• Provide supplemental irrigation in years of limited precipitation.

• Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.

• Increase the water intake rate by returning crop residue to the soil and rotating crops.

• Maintain or improve fertility by using a cropping system that includes grasses, legumes, or grass-legume mixtures, rotating crops, and growing cover crops.

• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.

• Maintain tilth by returning crop residue to the soil, using a cropping system that includes grasses, legumes, or grass-legume mixtures, and rotating crops.

• Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.

• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Red alder
Minor tree species: Western redcedar, western hemlock, Sitka spruce
Major understory species: Vine maple, salmonberry, elderberry, devilsclub, sedge

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: Seasonal high water table
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4w

200—Solo gravelly loamy sand, 0 to 8 percent slopes

Composition

Solo and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Fans, terraces
Parent material: Aerially and alluvially deposited volcanic ash and pumice overlying weakly cemented lahar
Slope range: 0 to 8 percent
Elevation: 400 to 1,600 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 150 to 200 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 2 inches—very dark gray gravelly loamy sand
2 to 9 inches—very dark grayish brown and dark brown gravelly loamy sand
9 to 20 inches—dark yellowish brown and brown gravelly loamy sand
20 to 32 inches—yellowish brown and brown gravelly sand
32 to 60 inches—grayish brown weakly cemented lahar that breaks to extremely gravelly sand

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Moderately well drained
Permeability: Rapid to a depth of 32 inches and slow below this depth
Available water capacity: Low
Potential rooting depth: 20 to 40 inches
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—1.5 to 3.0 feet; months—November through March
Hazard of flooding: None

Included Areas

• Soils that are less than 35 percent rock fragments throughout
• Soils that have lahar at a depth of less than 20 inches or more than 40 inches

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder, western hemlock
Minor tree species: Bigleaf maple
Major understory species: Vine maple, red huckleberry, cascade Oregongrape, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade for site preparation to reduce the risk of soil displacement.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4s

201—Speelyai gravelly loamy sand, 0 to 8 percent slopes

Composition

Speelyai and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Terraces
Parent material: Aerially and alluvially deposited volcanic ash and lahar of sand, gravel, and volcanic ash overlying weakly cemented lahar
Slope range: 0 to 8 percent
Elevation: 400 to 600 feet
Mean annual precipitation: 55 to 70 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 2 inches—very dark gray gravelly loamy sand
2 to 5 inches—dark gray gravelly loamy sand
5 to 11 inches—gray gravelly sand
11 to 60 inches—gray, weakly cemented lahar that breaks to very gravelly sand

Soil Properties and Qualities

Depth class: Shallow
Drainage class: Moderately well drained
Permeability: Rapid in the upper 10 to 20 inches and slow below this depth
Available water capacity: Low
Potential rooting depth: 10 to 20 inches
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—0.5 to 1.5 feet; months—November through April
Hazard of flooding: None

Included Areas

• Soils that are less than 35 percent rock fragments throughout
• Soils that have lahar at a depth of less than 10 inches or more than 20 inches
• Soils that have slopes of more than 8 percent
• Soils that are poorly drained

Major Uses

Woodland, pastureland, homesites

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, bigleaf maple
Major understory species: Vine maple, red huckleberry, cascade Oregongrape, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade for site preparation to reduce the risk of soil displacement.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Pastureland

General management considerations:
• The low available water capacity and seasonal high water table are the main limitations.

• Grasses and legumes grow well if they are adequately fertilized.
• Supplemental irrigation is needed for crops.
• The most suitable irrigation method is a sprinkler system.
• Because the soil is droughty, light and frequent applications of irrigation water are essential.
• Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.

Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Apply enough water to wet the root zone but not so much that it leaches plant nutrients.
• Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
• Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
• Maintain tilth by using a cropping system that includes grasses, legumes, or grass-legume mixtures.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Building Site Development

General management considerations:
• Septic tank absorption fields may function poorly because the seasonal wetness, limited depth to the hardpan, and slow permeability in the subsoil.
• Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a hazard to health.
• If the density of housing is moderate or high, a community sewage system may be needed.

Suitable management practices:
• Reduce wetness by providing drainage around buildings with basements and crawl spaces and installing perforated drain tile around the foundation.
• Use temporary sediment or debris basins to reduce the loss of soil material from construction sites.
• Stockpile topsoil and use it to reclaim areas disturbed during construction.
• Preserve the existing plant cover during construction to reduce the risk of erosion.
• Compensate for the slow permeability and the limited depth to the hardpan by increasing the size of the absorption field and backfilling the trench with porous material.
• Install culverts to carry seasonal runoff where roads cross natural drainageways.
• Preserve as many trees as possible.
• Remove pebbles and cobbles, particularly in areas used for lawns.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 6w

202—Speelyai gravelly loamy sand, 15 to 60 percent slopes

Composition

Speelyai and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Terrace escarpments
Parent material: Aerially and alluvially deposited volcanic ash and lahar of sand, gravel, and volcanic ash overlying weakly cemented lahar
Slope range: 15 to 60 percent
Elevation: 400 to 600 feet
Mean annual precipitation: 55 to 70 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

0 to 2 inches—very dark gray gravelly loamy sand
2 to 5 inches—dark gray gravelly loamy sand
5 to 11 inches—gray gravelly sand
11 to 60 inches—gray, weakly cemented lahar that breaks to very gravelly sand

Soil Properties and Qualities

Depth class: Shallow
Drainage class: Moderately well drained
Permeability: Rapid in the upper 10 to 20 inches and slow below this depth
Available water capacity: Low
Potential rooting depth: 10 to 20 inches
Runoff: Medium
Hazard of water erosion: Severe
Seasonal high water table: Kind—perched; depth—0.5 to 1.5 feet; months—November through April
Hazard of flooding: None

Included Areas

• Soils that are less than 35 percent rock fragments throughout
• Soils that have lahar at a depth of less than 10 inches or more than 20 inches

• Soils that have slopes of less than 15 percent or more than 60 percent

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, bigleaf maple
Major understory species: Vine maple, red huckleberry, cascade Oregongrape, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion on slopes of more than 30 percent; cable yarding systems—suitable

Equipment use

• Soil displacement and erosion can be minimized by using appropriate cable yarding systems on slopes of more than 30 percent.
• Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation to reduce soil displacement on slopes of less than 30 percent.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

203—Spodic Cryopsamments, 0 to 30 percent slopes

Composition

Spodic Cryopsamments and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Plains, terraces
Parent material: Pyroclastic flow deposits over volcanic ash
Slope range: 0 to 30 percent
Elevation: 2,600 to 3,200 feet
Mean annual precipitation: 125 to 135 inches
Mean annual air temperature: 37 to 39 degrees F
Growing season: 110 to 125 days (28 degrees F)
Periods of snowpack: December through March

Reference Profile

0 to 2 inches—very dark gray loamy sand
2 to 12 inches—mottled, dark brown loamy sand
12 to 55 inches—mottled, dark gray sand
55 to 60 inches—dark gray, dark brown, and gray, stratified loamy fine sand, sandy loam, and loamy sand

Soil Properties and Qualities

Depth class: Deep and very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Available water capacity: Low
Potential rooting depth: 40 to 60 inches or more
Runoff: Slow
Hazard of water erosion: Moderate
Hazard of wind erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 30 percent
• Soils that are gravelly throughout with fragments that are dominantly cinders
• Soils that have a silt loam subsoil

• Soils that have gravel and cobbles at a depth of 10 to 20 inches
• Soils that are warmer

Major Uses

Woodland, watershed, recreation, wildlife habitat

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, Pacific silver fir
Minor tree species: Western white pine
Major understory species: Vine maple, huckleberry, prince's pine, common beargrass, salmonberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation to reduce soil displacement.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

204—Stahl very gravelly silt loam, 30 to 65 percent slopes

Composition

Stahl and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Ridgetops, mountainslopes
Parent material: Residuum and colluvium derived from andesite with an admixture of volcanic ash
Slope range: 30 to 65 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 70 to 100 inches
Mean annual air temperature: 39 to 43 degrees F
Growing season: 140 to 160 days (28 degrees F)
Periods of snowpack: January through March

Typical Profile

2 inches to 0—organic mat
0 to 7 inches—very dark brown very gravelly silt loam
7 to 11 inches—dark brown extremely gravelly silt loam
11 to 36 inches—dark yellowish brown and yellowish brown extremely cobbly silt loam
36 inches—fractured andesite

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 20 to 40 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that have bedrock at a depth of less than 20 inches or more than 40 inches
• Soils that are less than 60 percent rock fragments throughout
• Soils that are warmer

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western redcedar
Major understory species: Cascade Oregongrape, common beargrass, western brackenfern, salal, huckleberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil erosion can be minimized by using appropriate cable yarding systems.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restriction to planting: Gravel in the soil
General management considerations:
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

205—Stahl-Reichel complex, 5 to 30 percent slopes

Composition

Stahl and similar soils—50 percent
Reichel and similar soils—35 percent
Contrasting soils—15 percent

Setting

Position on landscape: Ridgetops, mountainslopes
Parent material: Residuum and colluvium derived from weathered andesite with an admixture of volcanic ash
Slope range: 5 to 30 percent
Elevation: 2,800 to 3,200 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 39 to 43 degrees F
Growing season: 140 to 160 days (28 degrees F)
Periods of snowpack: January through March

Typical Profile

Stahl

2 inches to 0—organic mat
0 to 7 inches—very dark brown very gravelly silt loam
7 to 11 inches—dark brown extremely gravelly silt loam
11 to 36 inches—dark yellowish brown and yellowish brown extremely cobbly silt loam
36 inches—fractured andesite

Reichel

3 inches to 0—organic mat
0 to 19 inches—very dark brown and very dark grayish brown silt loam
19 to 47 inches—dark yellowish brown gravelly loam
47 to 53 inches—dark yellowish brown very cobbly loam
53 inches—fractured andesite

Soil Properties and Qualities

Depth class: Stahl—moderately deep; Reichel—deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Stahl—low; Reichel—high
Potential rooting depth: Stahl—20 to 40 inches; Reichel—40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent

- Soils that have bedrock at a depth of less than 20 inches or more than 60 inches
- Soils that are warmer
- Soils that are wet

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western redcedar, Alaska cedar
Major understory species: Cascade Oregongrape, common beargrass, western brackenfern, huckleberry, prince's pine, salal

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: Stahl—gravel in the soil; Reichel—none
General management considerations:

- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

206—Stahl-Reichel complex, 30 to 65 percent slopes

Composition

Stahl and similar soils—50 percent
Reichel and similar soils—35 percent
Contrasting soils—15 percent

Setting

Position on landscape: Ridgetops, mountainslopes
Parent material: Residuum and colluvium derived from andesite with an admixture of volcanic ash
Slope range: 30 to 65 percent
Elevation: 2,800 to 3,200 feet
Mean annual precipitation: 70 to 90 inches
Mean annual air temperature: 39 to 43 degrees F
Growing season: 140 to 160 days (28 degrees F)
Periods of snowpack: January through March

Typical Profile

Stahl

2 inches to 0—organic mat
0 to 7 inches—very dark brown very gravelly silt loam
7 to 11 inches—dark brown extremely gravelly silt loam
11 to 36 inches—dark yellowish brown and yellowish brown extremely cobbly silt loam
36 inches—fractured andesite

Reichel

3 inches to 0—organic mat
0 to 19 inches—very dark brown and very dark grayish brown silt loam
19 to 47 inches—dark yellowish brown gravelly loam
47 to 53 inches—dark yellowish brown very cobbly loam
53 inches—fractured andesite

Soil Properties and Qualities

Depth class: Stahl—moderately deep; Reichel—deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Stahl—low; Reichel—high
Potential rooting depth: Stahl—20 to 40 inches; Reichel—40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 30 percent or more than 65 percent
- Soils that have bedrock at a depth of less than 20 inches or more than 60 inches
- Soils that are warmer

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western redcedar, Alaska cedar
Major understory species: Cascade Oregongrape, common beargrass, western brackenfern, huckleberry, prince's pine, salal

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction and erosion can be minimized by using appropriate cable yarding systems.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: Stahl—gravel in the soil; Reichel—none
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

207—Stahl-Rock outcrop complex, 30 to 75 percent slopes

Composition

Stahl and similar soils—70 percent
Rock outcrop—20 percent
Contrasting soils—10 percent

Setting

Position on landscape: Ridgetops, mountainslopes
Parent material: Residuum and colluvium derived from andesite with an admixture of volcanic ash
Slope range: 30 to 75 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 70 to 100 inches
Mean annual air temperature: 39 to 43 degrees F
Growing season: 140 to 160 days (28 degrees F)
Periods of snowpack: January through March

Stahl

Typical profile

2 inches to 0—organic mat
0 to 7 inches—very dark brown very gravelly silt loam
7 to 11 inches—dark brown extremely gravelly silt loam
11 to 36 inches—dark yellowish brown and yellowish brown extremely cobbly silt loam
36 inches—fractured andesite

Soil properties and qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 20 to 40 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Boulder-sized humps, cliffs, or dikes of andesite

Included Areas

• Soils that have slopes of less than 30 percent or more than 75 percent
• Soils that have bedrock at a depth of less than 20 inches or more than 40 inches
• Soils that are less than 60 percent rock fragments throughout
• Soils that are warmer

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western redcedar
Major understory species: Cascade Oregongrape, common beargrass, western brackenfern, salal, huckleberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil erosion can be minimized by using appropriate cable yarding systems.
• Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases soil erosion.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: Gravel in the soil, Rock outcrop
General management considerations:
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Stahl—7e; Rock outcrop—8s

208—Stella silt loam, 3 to 8 percent slopes

Composition

Stella and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Ridgetops, hillslopes
Parent material: Loess over alluvium
Slope range: 3 to 8 percent
Elevation: 300 to 700 feet
Mean annual precipitation: 45 to 55 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

1 inch to 0—organic mat
0 to 11 inches—dark brown silt loam
11 to 25 inches—dark yellowish brown silt loam
25 to 48 inches—brown, dark brown, and grayish brown silty clay loam
48 to 60 inches—brown silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Very slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Seasonal high water table: Kind—perched; depth—2 to 3 feet; months—November through April
Hazard of flooding: None

Included Areas

- Soils that are poorly drained
- Soils that are somewhat poorly drained
- Soils that are well drained
- Soils that have slopes of less than 3 percent or more than 8 percent

Major Uses

Cropland, homesites, woodland, pastureland

Pastureland and Cropland

General management considerations:
- Grasses and legumes grow well if they are adequately fertilized.
- Supplemental irrigation is needed for crops.
- The most suitable irrigation method is a sprinkler system.
- Wetness limits the period of grazing.
- A tillage pan forms easily if the soil is tilled when wet.
- Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Provide supplemental irrigation in years of limited precipitation.
- Apply water at a slow rate over a long period to ensure that the root zone is properly wetted.
- Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
- Increase the water intake rate by returning crop residue to the soil, rotating crops, and using a cropping system that includes grasses, legumes, or grass-legume mixtures.
- Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
- Maintain tilth by returning crop residue to the soil, using a cropping system that includes grasses, legumes, or grass-legume mixtures, and rotating crops.
- Reduce the risk of compaction by returning crop residue to the soil and keeping tillage at a minimum.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple, grand fir
Major understory species: Vine maple, salal, cascade Oregongrape, salmonberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Building Site Development

General management considerations:
- Septic tank absorption fields may function poorly because of wetness late in winter and in spring and the very slow permeability, which restrict the movement and filtration of the effluent.
- If the density of housing is moderate or high, a community sewage system may be needed.

Suitable management practices:
- Prevent structural damage that results from shrinking and swelling by properly designing and building foundations, concrete structures, and paved areas and backfilling with material that has low shrink-swell potential.
- Compensate for the very slow permeability by increasing the size of the absorption field and backfilling trenches with porous material.
- Install culverts to carry seasonal runoff where roads cross natural drainageways.
- Reduce the risk of erosion on steep cuts and fills by establishing a plant cover.
- Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
- Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 3w

209—Stella silt loam, 8 to 15 percent slopes

Composition

Stella and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Ridgetops, hillslopes
Parent material: Loess over alluvium
Slope range: 8 to 15 percent
Elevation: 300 to 700 feet
Mean annual precipitation: 45 to 55 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

1 inch to 0—organic mat
0 to 11 inches—dark brown silt loam
11 to 25 inches—dark yellowish brown silt loam
25 to 48 inches—brown, dark brown, and grayish brown silty clay loam
48 to 60 inches—brown silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Very slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Seasonal high water table: Kind—perched; depth—2 to 3 feet; months—November through April
Hazard of flooding: None

Included Areas

- Soils that are poorly drained
- Soils that are somewhat poorly drained
- Soils that are well drained
- Soils that have slopes of less than 8 percent or more than 15 percent

Major Uses

Cropland, homesites, woodland, pastureland

Pastureland and Cropland

General management considerations:
- Steepness of slope is the main limitation.
- Grasses and legumes grow well if they are adequately fertilized.
- Supplemental irrigation is needed for crops.
- The most suitable irrigation method is a sprinkler system.
- Wetness limits the period of grazing.
- A tillage pan forms easily if the soil is tilled when wet.
- Most crops respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
- Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Provide supplemental irrigation in years of limited precipitation.
- Apply water at a slow rate over a long period to ensure that the root zone is properly wetted.
- Adjust applications of irrigation water to the available water capacity, the water intake rate, and the needs of the crop grown to avoid overirrigating and leaching of plant nutrients.
- Increase the water intake rate by returning crop residue to the soil, rotating crops, and using a cropping system that includes grasses, legumes, or grass-legume mixtures.
- Maintain the content of organic matter by using a suitable rotation and returning crop residue to the soil.
- Maintain tilth by returning crop residue to the soil, using a cropping system that includes grasses, legumes, or grass-legume mixtures, and rotating crops.
- Reduce the risk of erosion by fertilizing, tilling and seeding on the contour or across the slope, and maintaining the organic matter content.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple, grand fir
Major understory species: Vine maple, salal, cascade Oregongrape, salmonberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Building Site Development

General management considerations:
• Septic tank absorption fields may function poorly because of wetness late in winter and in spring and the very slow permeability, which restrict the movement and filtration of the effluent.
• If the density of housing is moderate or high, a community sewage system may be needed.
Suitable management practices:
• Prevent structural damage that results from shrinking and swelling by properly designing and building foundations, concrete structures, and paved areas and by backfilling with material that has low shrink-swell potential.
• Compensate for the very slow permeability by increasing the size of the absorption field and backfilling trenches with porous material.
• Install culverts to carry seasonal runoff where roads cross natural drainageways.
• Reduce the risk of erosion on steep cuts and fills by establishing a plant cover.
• Establish and maintain the plant cover by fertilizing, seeding, mulching, and shaping the slopes.
• Irrigate lawn grasses, shrubs, vines, shade trees, and ornamental trees in summer.

Interpretive Groups

Capability subclass: 3e

210—Stella silt loam, 15 to 30 percent slopes

Composition

Stella and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Ridgetops, hillslopes
Parent material: Loess over alluvium
Slope range: 15 to 30 percent
Elevation: 300 to 700 feet
Mean annual precipitation: 45 to 55 inches
Mean annual air temperature: 50 to 52 degrees F
Growing season: 220 to 240 days (28 degrees F)

Typical Profile

1 inch to 0—organic mat
0 to 11 inches—dark brown silt loam
11 to 25 inches—dark yellowish brown silt loam
25 to 48 inches—brown, dark brown, and grayish brown silty clay loam
48 to 60 inches—brown silty clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Very slow
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Seasonal high water table: Kind—perched; depth—2 to 3 feet; months—November through April
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 15 percent or more than 30 percent
• Soils that are poorly drained
• Soils that are somewhat poorly drained
• Soils that are well drained
• Soils that are silty clay loam in the upper 11 inches

Major Uses

Woodland, wildlife habitat, pastureland

Pastureland

General management considerations:
• Steepness of slope is the main limitation.
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

Suitable management practices:
- Provide supplemental irrigation in years of limited precipitation.
- Reduce the risk of erosion by fertilizing and by tilling and seeding on the contour or across the slope.
- Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple, grand fir
Major understory species: Vine maple, salal, cascade Oregongrape, salmonberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

211—Studebaker very gravelly loamy sand, 0 to 20 percent slopes

Composition

Studebaker and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Valley floors
Parent material: Avalanche debris flow
Slope range: 0 to 20 percent
Elevation: 2,700 to 3,200 feet
Mean annual precipitation: 125 to 140 inches
Mean annual air temperature: 40 to 45 degrees F
Growing season: 70 to 90 days (28 degrees F)

Typical Profile

0 to 8 inches—dark gray very gravelly loamy sand
8 to 60 inches—dark gray extremely gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Available water capacity: Low
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that are extremely cindery loamy sand throughout
- Soils that are very fine sandy loam throughout
- Soils that have slopes of more than 20 percent

Major Uses

Wildlife habitat, recreation

Interpretive Groups

Capability subclass: 6s

212—Swem cobbly silt loam, 5 to 30 percent slopes

Composition

Swem and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, toeslopes
Parent material: Colluvium derived from basalt and volcanic breccia overlying siltstone and sandstone
Slope range: 5 to 30 percent
Elevation: 600 to 1,800 feet
Mean annual precipitation: 70 to 110 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 12 inches—very dark grayish brown cobbly silt loam
12 to 32 inches—dark yellowish brown gravelly silt loam
32 to 60 inches—brown clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 40 to 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Seasonal high water table: Kind—perched; depth—2.5 to 3.5 feet; months—November through April
Hazard of flooding: None

Included Areas

- Soils that have slopes of more than 30 percent
- Soils that have bedrock at a depth of 20 to 60 inches
- Soils that are well drained
- Soils that do not have gravel and cobbles

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock, red alder
Minor tree species: Western redcedar, bigleaf maple, Sitka spruce
Major understory species: Salal, vine maple, salmonberry, western swordfern, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

213—Swem cobbly silt loam, 30 to 65 percent slopes

Composition

Swem and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, toeslopes
Parent material: Colluvium derived from basalt and volcanic breccia overlying siltstone and sandstone
Slope range: 30 to 65 percent
Elevation: 600 to 1,800 feet
Mean annual precipitation: 70 to 110 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 240 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 12 inches—very dark grayish brown cobbly silt loam

12 to 32 inches—dark yellowish brown gravelly silt loam
32 to 60 inches—brown silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Available water capacity: High
Potential rooting depth: 40 to 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Seasonal high water table: Kind—perched; depth—2.5 to 3.5 feet; months—November through April
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that have bedrock at a depth of 20 to 60 inches
• Soils that are well drained
• Soils that do not have gravel and cobbles

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock, red alder
Minor tree species: Western redcedar, bigleaf maple, Sitka spruce
Major understory species: Salal, vine maple, salmonberry, western swordfern, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

214—Swift loamy sand, overblown, 30 to 65 percent slopes

Composition

Swift, overblown, and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite and volcanic ash with a mantle of volcanic ash and cinders
Slope range: 30 to 65 percent
Elevation: 1,600 to 2,800 feet
Mean annual precipitation: 90 to 120 inches
Mean annual air temperature: 42 to 45 degrees F
Growing season: 140 to 175 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

0 to 5 inches—dark gray loamy sand
5 to 9 inches—very dark grayish brown and dark yellowish brown sandy loam
9 to 17 inches—dark yellowish brown gravelly sandy loam
17 to 29 inches—yellowish brown very gravelly loam
29 to 60 inches—brown extremely cobbly loam

Soil Properties and Qualities

Depth class: Very deep

Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that have a gravelly surface layer with fragments that are dominantly cinders
• Soils that have a sandy loam surface layer
• Soils that are colder
• Soils that have a gravelly substratum

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir
Minor tree species: Bigleaf maple
Major understory species: Vine maple, red huckleberry, salal, trailing blackberry, western brackenfern, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restriction to planting: Deposits of volcanic ash on surface
General management considerations:
• Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

215—Swift loamy sand, overblown, 65 to 90 percent slopes

Composition

Swift, overblown, and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from andesite and volcanic ash with a mantle of volcanic ash and cinders
Slope range: 65 to 90 percent
Elevation: 1,600 to 2,800 feet
Mean annual precipitation: 90 to 120 inches
Mean annual air temperature: 42 to 45 degrees F
Growing season: 140 to 175 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

0 to 5 inches—dark gray loamy sand
5 to 9 inches—very dark grayish brown and dark yellowish brown sandy loam

9 to 17 inches—dark yellowish brown gravelly sandy loam
17 to 29 inches—yellowish brown very gravelly loam
29 to 60 inches—brown extremely cobbly loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Very rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that have a gravelly surface layer with fragments that are dominantly cinders
- Soils that have a sandy loam surface layer
- Soils that are colder
- Soils that have a gravelly substratum

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir
Minor tree species: Bigleaf maple
Major understory species: Vine maple, red huckleberry, salal, trailing blackberry, western brackenfern, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restriction to planting: Deposits of volcanic ash on surface
General management considerations:
- Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

216—Swift sandy loam, 5 to 30 percent slopes

Composition

Swift and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite and volcanic ash with a mantle of volcanic ash and cinders
Slope range: 5 to 30 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 90 to 120 inches
Mean annual air temperature: 42 to 45 degrees F
Growing season: 140 to 175 days (28 degrees F)

Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 4 inches—very dark grayish brown and dark yellowish brown sandy loam
4 to 12 inches—dark yellowish brown gravelly sandy loam
12 to 24 inches—yellowish brown gravelly sandy loam
24 to 60 inches—brown extremely cobbly loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 5 percent or more than 30 percent
- Soils that have a gravelly surface layer with fragments that are dominantly cinders
- Soils that have a loamy sand surface layer
- Soils that are colder
- Soils that have a gravelly substratum

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Vine maple, red huckleberry, salal, trailing blackberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock—periodically
Restrictions to planting: None
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

217—Swift sandy loam, 30 to 65 percent slopes

Composition

Swift and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from andesite and volcanic ash with a mantle of volcanic ash and cinders
Slope range: 30 to 65 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 90 to 120 inches
Mean annual air temperature: 42 to 45 degrees F
Growing season: 140 to 175 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 4 inches—very dark grayish brown and dark yellowish brown sandy loam

4 to 12 inches—dark yellowish brown gravelly sandy loam
12 to 24 inches—yellowish brown gravelly sandy loam
24 to 60 inches—brown extremely cobbly loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 30 percent or more than 65 percent
- Soils that have a gravelly surface layer with fragments that are dominantly cinders
- Soils that have a loamy sand surface layer
- Soils that are colder
- Soils that have a gravelly substratum

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Vine maple, red huckleberry, salal, trailing blackberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—periodically
Restrictions to planting: None
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

218—Swift sandy loam, 65 to 90 percent slopes

Composition

Swift and similar soils—70 percent
Contrasting soils—30 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from andesite and volcanic ash with a mantle of volcanic ash and cinders
Slope range: 65 to 90 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 90 to 120 inches
Mean annual air temperature: 42 to 45 degrees F
Growing season: 140 to 175 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 4 inches—very dark grayish brown and dark yellowish brown sandy loam
4 to 12 inches—dark yellowish brown gravelly sandy loam

12 to 24 inches—yellowish brown gravelly sandy loam
24 to 60 inches—brown extremely cobbly loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Very rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that have a gravelly surface layer with fragments that are dominantly cinders
- Soils that have a loamy sand surface layer
- Soils that are colder
- Soils that have a gravelly substratum

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Vine maple, red huckleberry, salal, trailing blackberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
- Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil compaction and erosion.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—periodically
Restriction to planting: Rock outcrop
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

219—Swift-Rock outcrop complex, 30 to 65 percent slopes

Composition

Swift and similar soils—70 percent
Rock outcrop—15 percent
Contrasting soils—15 percent

Setting

Position on landscape: Ridgetops, mountainslopes
Parent material: Residuum and colluvium derived from andesite and volcanic ash with a mantle of volcanic ash and cinders
Slope range: 30 to 65 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 90 to 120 inches
Mean annual air temperature: 42 to 45 degrees F
Growing season: 140 to 175 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Swift

Typical profile

2 inches to 0—organic mat

0 to 4 inches—very dark grayish brown and dark yellowish brown sandy loam
4 to 12 inches—dark yellowish brown gravelly sandy loam
12 to 24 inches—yellowish brown gravelly sandy loam
24 to 60 inches—brown extremely cobbly loam

Soil properties and qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite and basalt

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that have a gravelly surface layer with fragments that are dominantly cinders
• Soils that have a loamy sand surface layer
• Soils that are colder
• Soils that have a gravelly substratum
• Soils that have bedrock at a depth of less than 60 inches

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Vine maple, red huckleberry, salal, trailing blackberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
• Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil compaction and erosion.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—periodically
Restrictions to planting: None
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Swift—7e; Rock outcrop—8s

220—Swift-Rock outcrop complex, 65 to 90 percent slopes

Composition

Swift and similar soils—70 percent
Rock outcrop—15 percent
Contrasting soils—15 percent

Setting

Position on landscape: Ridgetops, mountainslopes
Parent material: Residuum and colluvium derived from andesite and volcanic ash with a mantle of volcanic ash and cinders
Slope range: 65 to 90 percent
Elevation: 1,800 to 2,800 feet

Mean annual precipitation: 90 to 120 inches
Mean annual air temperature: 42 to 45 degrees F
Growing season: 140 to 175 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Swift

Typical profile

2 inches to 0—organic mat
0 to 4 inches—very dark grayish brown and dark yellowish brown sandy loam
4 to 12 inches—dark yellowish brown gravelly sandy loam
12 to 24 inches—yellowish brown gravelly sandy loam
24 to 60 inches—brown extremely cobbly loam

Soil properties and qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite and basalt

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that have a gravelly surface layer with fragments that are dominantly cinders
- Soils that have a loamy sand surface layer
- Soils that are colder
- Soils that have a gravelly substratum
- Soils that have bedrock at a depth of less than 60 inches

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Vine maple, red huckleberry, salal, trailing blackberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
- Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil compaction and erosion.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—periodically
Restriction to planting: Rock outcrop
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Swift—7e; Rock outcrop—8s

221—Swift, overblown-Rock outcrop complex, 40 to 90 percent slopes

Composition

Swift, overblown, and similar soils—70 percent

Rock outcrop—15 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from andesite and volcanic ash with a mantle of volcanic ash and cinders
Slope range: 40 to 90 percent
Elevation: 1,600 to 2,800 feet
Mean annual precipitation: 90 to 120 inches
Mean annual air temperature: 42 to 45 degrees F
Growing season: 140 to 175 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Swift, Overblown

Typical profile

0 to 5 inches—dark gray loamy sand
5 to 9 inches—very dark grayish brown and dark yellowish brown sandy loam
9 to 17 inches—dark yellowish brown gravelly sandy loam
17 to 29 inches—yellowish brown very gravelly loam
29 to 60 inches—brown extremely cobbly loam

Soil properties and qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Very rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite and basalt

Included Areas

- Soils that have slopes of less than 40 percent
- Soils that have a gravelly surface layer with fragments that are dominantly cinders
- Soils that have a sandy loam surface layer
- Soils that are colder
- Soils that have a gravelly substratum

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir
Minor tree species: Bigleaf maple
Major understory species: Vine maple, red huckleberry, salal, trailing blackberry, western brackenfern, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
- Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil compaction and erosion.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restrictions to planting: Rock outcrop, deposits of volcanic ash on surface
General management considerations:
- Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use power augers to mix the ash with the underlying pre-1980 soil material.

• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Swift, overblown—7e; Rock outcrop—8s

222—Vader loam, 5 to 30 percent slopes

Composition

Vader and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes
Parent material: Residuum and colluvium derived from sandstone
Slope range: 5 to 30 percent
Elevation: 50 to 1,800 feet
Mean annual precipitation: 50 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 175 to 220 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 6 inches—dark yellowish brown loam
6 to 40 inches—dark yellowish brown fine sandy loam
40 to 60 inches—dark yellowish brown loamy sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that have sandstone or siltstone fragments throughout
• Soils that are silt loam or silty clay loam throughout
• Soils that are moderately well drained

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, bigleaf maple, western redcedar, bitter cherry
Major understory species: Salal, cascade Oregongrape, western brackenfern, western swordfern, red huckleberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

223—Vader loam, 30 to 65 percent slopes

Composition

Vader and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes
Parent material: Residuum and colluvium derived from sandstone

Slope range: 30 to 65 percent
Elevation: 50 to 1,800 feet
Mean annual precipitation: 50 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 175 to 220 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 6 inches—dark yellowish brown loam
6 to 40 inches—dark yellowish brown fine sandy loam
40 to 60 inches—dark yellowish brown loamy sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 30 percent
- Soils that have sandstone or siltstone fragments throughout
- Soils that are silt loam or silty clay loam throughout
- Soils that are moderately well drained

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, bigleaf maple, western redcedar, bitter cherry
Major understory species: Salal, cascade Oregongrape, western brackenfern, western swordfern, red huckleberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

224—Vanson loamy sand, overblown, 5 to 30 percent slopes

Composition

Vanson, overblown, and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from igneous rock with a mantle of volcanic ash and pumice
Slope range: 5 to 30 percent
Elevation: 2,600 to 4,100 feet
Mean annual precipitation: 80 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

0 to 5 inches—dark gray loamy sand
5 to 11 inches—dark brown sandy loam

11 to 17 inches—gray gravelly loamy sand
17 to 23 inches—dark yellowish brown sandy loam
23 to 25 inches—strong brown and yellowish red very gravelly loamy sand
25 to 56 inches—yellowish brown very gravelly loam
56 inches—hard andesite

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 5 percent or more than 30 percent
- Soils that are warmer
- Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
- Soils that have a sandy loam surface layer
- Soils that have soft rock or glacial till in the substratum
- Soils that are wet

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Vine maple, huckleberry, salal, common beargrass, cascade Oregongrape, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation to reduce soil displacement.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: None
Restriction to planting: Deposits of volcanic ash on surface
General management considerations:
- Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

225—Vanson loamy sand, overblown, 30 to 65 percent slopes

Composition

Vanson, overblown, and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from igneous rock with a mantle of volcanic ash and pumice
Slope range: 30 to 65 percent
Elevation: 2,600 to 4,100 feet
Mean annual precipitation: 80 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

0 to 5 inches—dark gray loamy sand
5 to 11 inches—dark brown sandy loam
11 to 17 inches—gray gravelly loamy sand
17 to 23 inches—dark yellowish brown sandy loam
23 to 25 inches—strong brown and yellowish red very gravelly loamy sand
25 to 56 inches—yellowish brown very gravelly loam
56 inches—hard andesite

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 30 percent or more than 65 percent
- Soils that are warmer
- Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
- Soils that have a loamy sand surface layer
- Soils that have soft rock or glacial till in the substratum

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Vine maple, huckleberry, salal, common beargrass, cascade Oregongrape, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restriction to planting: Deposits of volcanic ash on surface
General management considerations:
- Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

226—Vanson loamy sand, overblown, 65 to 90 percent slopes

Composition

Vanson, overblown, and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from igneous rock with a mantle of volcanic ash and pumice

Slope range: 65 to 90 percent
Elevation: 2,600 to 4,100 feet
Mean annual precipitation: 80 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

0 to 5 inches—dark gray loamy sand
5 to 11 inches—dark brown sandy loam
11 to 17 inches—gray gravelly loamy sand
17 to 23 inches—dark yellowish brown sandy loam
23 to 25 inches—strong brown and yellowish red very gravelly loamy sand
25 to 56 inches—yellowish brown very gravelly loam
56 inches—hard andesite

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that are warmer
- Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
- Soils that have a sandy loam surface layer
- Soils that have soft rock or glacial till in the substratum

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Vine maple, huckleberry, salal, common beargrass, cascade Oregongrape, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restriction to planting: Deposits of volcanic ash on surface
General management considerations:
- Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

227—Vanson loamy sand, till substratum, overblown, 5 to 30 percent slopes

Composition

Vanson, overblown, and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium from igneous rock with a mantle of volcanic ash and pumice
Slope range: 5 to 30 percent
Elevation: 2,800 to 4,000 feet
Mean annual precipitation: 80 to 110 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

0 to 6 inches—dark gray loamy sand
6 to 17 inches—gray and light brown gravelly or cobbly sandy loam with strong brown and dark yellowish brown mottles
17 to 42 inches—dark yellowish brown, yellowish brown, and brown very gravelly and extremely gravelly sandy loam
42 to 60 inches—slightly compact glacial till that breaks to grayish brown extremely gravelly loamy sand

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 5 percent or more than 30 percent
- Soils that are warmer
- Soils that have glacial till at a depth of less than 40 inches or more than 60 inches
- Soils that have a sandy loam surface layer
- Soils that have bedrock in the substratum
- Soils that are wet

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Vine maple, huckleberry, salal, common beargrass, cascade Oregongrape, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation to reduce soil displacement.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: None
Restriction to planting: Deposits of volcanic ash on surface
General management considerations:
- Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

228—Vanson loamy sand, till substratum, overblown, 30 to 65 percent slopes

Composition

Vanson, overblown, and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from igneous rock with a mantle of volcanic ash and pumice
Slope range: 30 to 65 percent
Elevation: 2,800 to 4,000 feet
Mean annual precipitation: 80 to 110 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

0 to 6 inches—dark gray loamy sand
6 to 17 inches—gray and light brown gravelly or cobbly sandy loam with strong brown and dark yellowish brown mottles
17 to 42 inches—dark yellowish brown, yellowish brown, and brown very gravelly and extremely gravelly sandy loam
42 to 60 inches—slightly compact glacial till that breaks to grayish brown extremely gravelly loamy sand

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are warmer
• Soils that have glacial till at a depth of less than 40 inches or more than 60 inches
• Soils that have a sandy loam surface layer
• Soils that have bedrock in the substratum

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Vine maple, huckleberry, salal, common beargrass, cascade Oregongrape, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restriction to planting: Deposits of volcanic ash on surface
General management considerations:
• Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

229—Vanson sandy loam, 5 to 30 percent slopes

Composition

Vanson and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, broad ridgetops
Parent material: Residuum and colluvium derived from igneous rock with a mantle of volcanic ash and pumice
Slope range: 5 to 30 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

3 inches to 0—organic mat
0 to 6 inches—dark brown sandy loam
6 to 12 inches—gray gravelly loamy sand
12 to 18 inches—dark yellowish brown sandy loam
18 to 20 inches—strong brown and yellowish red very gravelly loamy sand
20 to 51 inches—yellowish brown and dark yellowish brown very gravelly loam
51 inches—hard andesite

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 5 percent or more than 30 percent
- Soils that are warmer
- Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
- Soils that have a loamy sand surface layer
- Soils that have soft rock or glacial till in the substratum
- Soils that are wet

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western white pine
Major understory species: Vine maple, huckleberry, salal, common beargrass, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation to reduce soil displacement.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

230—Vanson sandy loam, 30 to 65 percent slopes

Composition

Vanson and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from igneous rock with a mantle of volcanic ash and pumice
Slope range: 30 to 65 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

3 inches to 0—organic mat
0 to 6 inches—dark brown sandy loam
6 to 12 inches—gray gravelly loamy sand
12 to 18 inches—dark yellowish brown sandy loam
18 to 20 inches—strong brown and yellowish red very gravelly loamy sand
20 to 51 inches—yellowish brown and dark yellowish brown very gravelly loam
51 inches—hard andesite

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 30 percent or more than 65 percent
- Soils that are warmer
- Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
- Soils that have a loamy sand surface layer
- Soils that have soft rock or glacial till in the substratum
- Soils that are wet

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western white pine
Major understory species: Vine maple, huckleberry, salal, common beargrass, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

231—Vanson sandy loam, 65 to 90 percent slopes

Composition

Vanson and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from igneous rock with a mantle of volcanic ash and pumice
Slope range: 65 to 90 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

3 inches to 0—organic mat
0 to 6 inches—dark brown sandy loam
6 to 12 inches—gray gravelly loamy sand
12 to 18 inches—dark yellowish brown sandy loam
18 to 20 inches—strong brown and yellowish red very gravelly loamy sand
20 to 51 inches—yellowish brown and dark yellowish brown very gravelly loam
51 inches—hard andesite

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 65 percent
• Soils that are warmer
• Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
• Soils that have a loamy sand surface layer
• Soils that have soft rock or glacial till in the substratum

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western white pine
Major understory species: Vine maple, huckleberry, salal, common beargrass, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

232—Vanson sandy loam, tuff substratum, 5 to 30 percent slopes

Composition

Vanson and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, broad ridgetops
Parent material: Residuum and colluvium derived from igneous rock and tuff with a mantle of volcanic ash and pumice
Slope range: 5 to 30 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

3 inches to 0—organic mat
0 to 6 inches—dark brown sandy loam
6 to 12 inches—gray gravelly loamy sand
12 to 18 inches—dark yellowish brown sandy loam
18 to 20 inches—strong brown and yellowish red very gravelly loamy sand
20 to 51 inches—yellowish brown and dark yellowish brown very gravelly loam
51 to 61 inches—soft tuffaceous bedrock

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that are warmer
• Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
• Soils that have a loamy sand surface layer
• Soils that have hard rock or glacial till in the substratum

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, Pacific silver fir
Minor tree species: Noble fir, western white pine
Major understory species: Vine maple, huckleberry, salal, common beargrass, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation to reduce soil displacement.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

233—Vanson sandy loam, tuff substratum, 30 to 65 percent slopes

Composition

Vanson and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from igneous rock and tuff with a mantle of volcanic ash and pumice
Slope range: 30 to 65 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

3 inches to 0—organic mat
0 to 6 inches—dark brown sandy loam
6 to 12 inches—gray gravelly loamy sand
12 to 18 inches—dark yellowish brown sandy loam
18 to 20 inches—strong brown and yellowish red very gravelly loamy sand
20 to 51 inches—yellowish brown and dark yellowish brown very gravelly loam
51 to 61 inches—soft tuffaceous bedrock

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are warmer
• Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
• Soils that have a loamy sand surface layer
• Soils that have hard rock or glacial till in the substratum

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western white pine
Major understory species: Vine maple, huckleberry, salal, common beargrass, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

234—Vanson cobbly sandy loam, till substratum, 5 to 30 percent slopes

Composition

Vanson and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from igneous rock with a mantle of volcanic ash and pumice
Slope range: 5 to 30 percent
Elevation: 2,800 to 4,000 feet
Mean annual precipitation: 80 to 110 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

3 inches to 0—organic mat
0 to 7 inches—gray and light brown cobbly sandy loam with strong brown and dark yellowish brown mottles
7 to 22 inches—dark yellowish brown, yellowish brown, and brown gravelly sandy loam and cobbly sandy loam
22 to 42 inches—dark yellowish brown, yellowish brown, and brown very gravelly and extremely gravelly sandy loam
42 to 60 inches—slightly compact glacial till that breaks to grayish brown extremely gravelly loamy sand

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 5 percent or more than 30 percent
- Soils that are warmer
- Soils that have glacial till at a depth of less than 40 inches or more than 60 inches
- Soils that have a loamy sand surface layer
- Soils that have bedrock in the substratum
- Soils that are wet

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir
Major understory species: Vine maple, huckleberry, salal, common beargrass, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation to minimize soil displacement.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

235—Vanson cobbly sandy loam, till substratum, 30 to 65 percent slopes

Composition

Vanson and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from igneous rock with a mantle of volcanic ash and pumice
Slope range: 30 to 65 percent
Elevation: 2,800 to 4,000 feet
Mean annual precipitation: 80 to 110 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

3 inches to 0—organic mat
0 to 7 inches—gray and light brown cobbly sandy loam with strong brown and dark yellowish brown mottles
7 to 22 inches—dark yellowish brown, yellowish brown, and brown gravelly sandy loam and cobbly sandy loam
22 to 42 inches—dark yellowish brown, yellowish brown, and brown very gravelly and extremely gravelly sandy loam
42 to 60 inches—slightly compact glacial till that breaks to grayish brown extremely gravelly loamy sand

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Low
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are warmer
• Soils that have glacial till at a depth of less than 40 inches or more than 60 inches
• Soils that have a loamy sand surface layer
• Soils that have bedrock in the substratum

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir
Major understory species: Vine maple, huckleberry, salal, common beargrass, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

236—Vanson-Hatchet loamy sands, overblown, 5 to 30 percent slopes

Composition

Vanson, overblown, and similar soils—50 percent
Hatchet, overblown, and similar soils—35 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes, broad ridgetops
Parent material: Residuum and colluvium derived from andesite with a mantle of volcanic ash and pumice
Slope range: 5 to 30 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 120 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through April

Typical Profile

Vanson, overblown

0 to 5 inches—dark gray loamy sand
5 to 11 inches—dark brown sandy loam
11 to 17 inches—gray gravelly loamy sand
17 to 23 inches—dark yellowish brown sandy loam
23 to 25 inches—strong brown and yellowish red very gravelly loamy sand
25 to 56 inches—yellowish brown very gravelly loam
56 inches—hard andesite

Hatchet, overblown

0 to 5 inches—dark gray loamy sand
5 to 23 inches—dark brown extremely cobbly loam
23 to 38 inches—dark yellowish brown and yellowish brown extremely cobbly sandy loam
38 inches—fractured andesite

Soil Properties and Qualities

Depth class: Vanson—deep; Hatchet—moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Vanson—moderate; Hatchet—low
Potential rooting depth: Vanson—40 to 60 inches; Hatchet—20 to 40 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that are warmer
• Soils that have bedrock at a depth of less than 20 inches or more than 60 inches
• Soils that have a sandy loam surface layer
• Soils that have a loamy sand surface layer more than 5 inches thick
• Soils that have soft rock or glacial till in the substratum

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Vine maple, common beargrass, huckleberry, salal, cascade Oregongrape, deerfern, starflower, prince's pine, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation to minimize soil displacement.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: None
Restrictions to planting: Vanson—deposits of volcanic ash on surface; Hatchet—cobbles in the soil; deposits of volcanic ash on surface

General management considerations:
• Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

237—Vanson-Hatchet loamy sands, overblown, 30 to 65 percent slopes

Composition

Vanson, overblown, and similar soils—50 percent
Hatchet, overblown, and similar soils—35 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite with a mantle of volcanic ash and pumice
Slope range: 30 to 65 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 120 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through April

Typical Profile

Vanson, overblown

0 to 5 inches—dark gray loamy sand
5 to 11 inches—dark brown sandy loam
11 to 17 inches—gray gravelly loamy sand
17 to 23 inches—dark yellowish brown sandy loam
23 to 25 inches—strong brown and yellowish red very gravelly loamy sand
25 to 56 inches—yellowish brown very gravelly loam
56 inches—hard andesite

Hatchet, overblown

0 to 5 inches—dark gray loamy sand
5 to 23 inches—dark brown extremely cobbly loam
23 to 38 inches—dark yellowish brown and yellowish brown extremely cobbly sandy loam
38 inches—fractured andesite

Soil Properties and Qualities

Depth class: Vanson—deep; Hatchet—moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Vanson—moderate; Hatchet—low
Potential rooting depth: Vanson—40 to 60 inches; Hatchet—20 to 40 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are warmer
• Soils that have bedrock at a depth of less than 20 inches or more than 60 inches
• Soils that have a sandy loam surface layer
• Soils that have a loamy sand surface layer more than 5 inches thick
• Soils that have soft rock or glacial till in the substratum

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Vine maple, common beargrass, huckleberry, salal, cascade Oregongrape, deerfern, starflower, prince's pine, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—optional

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restrictions to planting: Vanson—deposits of volcanic ash on surface; Hatchet—cobbles in the soil, deposits of volcanic ash on surface
General management considerations:
- Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

238—Vanson-Hatchet loamy sands, overblown, 65 to 90 percent slopes

Composition

Vanson, overblown, and similar soils—50 percent
Hatchet, overblown, and similar soils—35 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite with a mantle of volcanic ash and pumice
Slope range: 65 to 90 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 120 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through April

Typical Profile

Vanson, overblown

0 to 5 inches—dark gray loamy sand
5 to 11 inches—dark brown sandy loam
11 to 17 inches—gray gravelly loamy sand
17 to 23 inches—dark yellowish brown sandy loam
23 to 25 inches—strong brown and yellowish red very gravelly loamy sand
25 to 56 inches—yellowish brown very gravelly loam
56 inches—hard andesite

Hatchet, overblown

0 to 5 inches—dark gray loamy sand
5 to 23 inches—dark brown extremely cobbly loam
23 to 38 inches—dark yellowish brown and yellowish brown extremely cobbly sandy loam
38 inches—fractured andesite

Soil Properties and Qualities

Depth class: Vanson—deep; Hatchet—moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Vanson—moderate; Hatchet—low
Potential rooting depth: Vanson—40 to 60 inches; Hatchet—20 to 40 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that are warmer
- Soils that have bedrock at a depth of less than 20 inches or more than 60 inches
- Soils that have a sandy loam surface layer
- Soils that have a loamy sand surface layer more than 5 inches thick
- Soils that have soft rock or glacial till in the substratum

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Vine maple, common beargrass, huckleberry, salal, cascade Oregongrape, deerfern, starflower, prince's pine, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—optional

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restrictions to planting: Vanson—deposits of volcanic ash on surface; Hatchet—cobbles in the soil, deposits of volcanic ash on surface
General management considerations:
• Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

239—Vanson-Hatchet complex, 5 to 30 percent slopes

Composition

Vanson and similar soils—50 percent
Hatchet and similar soils—30 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, broad ridgetops
Parent material: Residuum and colluvium derived from andesite with a mantle of volcanic ash and pumice
Slope range: 5 to 30 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 120 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through April

Typical Profile

Vanson

3 inches to 0—organic mat
0 to 6 inches—dark brown sandy loam
6 to 12 inches—gray gravelly loamy sand
12 to 18 inches—dark yellowish brown sandy loam
18 to 20 inches—strong brown and yellowish red very gravelly loamy sand
20 to 51 inches—yellowish brown very gravelly loam
51 inches—hard andesite

Hatchet

4 inches to 0—organic mat
0 to 18 inches—dark brown very cobbly sandy loam
18 to 33 inches—dark yellowish brown and yellowish brown extremely cobbly sandy loam
33 inches—fractured andesite

Soil Properties and Qualities

Depth class: Vanson—deep; Hatchet—moderately deep
Drainage class: Well drained

Permeability: Moderate
Available water capacity: Vanson—moderate; Hatchet—low
Potential rooting depth: Vanson—40 to 60 inches; Hatchet—20 to 40 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that are warmer
• Soils that have bedrock at a depth of less than 20 inches or more than 60 inches
• Soils that have a loamy sand surface layer
• Soils that have soft rock or glacial till in the substratum

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western white pine
Major understory species: Vine maple, common beargrass, huckleberry, salal, cascade Oregongrape, deerfern, starflower, prince's pine

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation to minimize soil displacement.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: Vanson—none; Hatchet—cobbles in the soil
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Vanson—6e; Hatchet—6s

240—Vanson-Hatchet complex, 30 to 65 percent slopes

Composition

Vanson and similar soils—50 percent
Hatchet and similar soils—30 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from andesite with a mantle of volcanic ash and pumice
Slope range: 30 to 65 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 120 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through April

Typical Profile

Vanson

3 inches to 0—organic mat
0 to 6 inches—dark brown sandy loam
6 to 12 inches—gray gravelly loamy sand
12 to 18 inches—dark yellowish brown sandy loam
18 to 20 inches—strong brown and yellowish red very gravelly loamy sand
20 to 51 inches—yellowish brown very gravelly loam
51 inches—hard andesite

Hatchet

4 inches to 0—organic mat

0 to 18 inches—dark brown very cobbly sandy loam
18 to 33 inches—dark yellowish brown and yellowish brown extremely cobbly sandy loam
33 inches—fractured andesite

Soil Properties and Qualities

Depth class: Vanson—deep; Hatchet—moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Vanson—moderate; Hatchet—low
Potential rooting depth: Vanson—40 to 60 inches; Hatchet—20 to 40 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 30 percent or more than 65 percent
- Soils that are warmer
- Soils that have bedrock at a depth of less than 20 inches or more than 60 inches
- Soils that have a loamy sand surface layer
- Soils that have soft rock or glacial till in the substratum
- Soils that are wet

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western white pine
Major understory species: Vine maple, common beargrass, huckleberry, salal, cascade Oregongrape, deerfern, starflower, prince's pine

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—optional

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: Vanson—none; Hatchet—cobbles in the soil
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

241—Vanson-Hatchet complex, 65 to 90 percent slopes

Composition

Vanson and similar soils—50 percent
Hatchet and similar soils—35 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from andesite with a mantle of volcanic ash and pumice
Slope range: 65 to 90 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 120 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through April

Typical Profile

Vanson

3 inches to 0—organic mat
0 to 6 inches—dark brown sandy loam
6 to 12 inches—gray gravelly loamy sand
12 to 18 inches—dark yellowish brown sandy loam
18 to 20 inches—strong brown and yellowish red very gravelly loamy sand
20 to 51 inches—yellowish brown very gravelly loam
51 inches—hard andesite

Hatchet

4 inches to 0—organic mat
0 to 18 inches—dark brown very cobbly sandy loam
18 to 33 inches—dark yellowish brown and yellowish brown extremely cobbly sandy loam
33 inches—fractured andesite

Soil Properties and Qualities

Depth class: Vanson—deep; Hatchet—moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Vanson—moderate; Hatchet—low
Potential rooting depth: Vanson—40 to 60 inches; Hatchet—20 to 40 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that are warmer
- Soils that have bedrock at a depth of less than 20 inches or more than 60 inches
- Soils that have a loamy sand surface layer
- Soils that have soft rock or glacial till in the substratum
- Areas of Rock outcrop

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western white pine
Major understory species: Vine maple, common beargrass, huckleberry, salal, cascade Oregongrape, deerfern, starflower, prince's pine

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—optional

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: Vanson—none; Hatchet—cobbles in the soil
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

242—Vanson-Rock outcrop complex, 30 to 65 percent slopes

Composition

Vanson and similar soils—70 percent

Rock outcrop—15 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes, broad ridgetops
Parent material: Residuum and colluvium derived from igneous rock with a mantle of volcanic ash and pumice
Slope range: 30 to 65 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Vanson

Typical profile

3 inches to 0—organic mat
0 to 6 inches—dark brown sandy loam
6 to 12 inches—gray gravelly loamy sand
12 to 18 inches—dark yellowish brown sandy loam
18 to 20 inches—strong brown and yellowish red very gravelly loamy sand
20 to 51 inches—yellowish brown and dark yellowish brown very gravelly loam
51 inches—hard andesite

Soil properties and qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite

Included Areas

- Soils that have slopes of less than 30 percent or more than 65 percent
- Soils that are warmer
- Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
- Soils that have a loamy sand surface layer
- Soils that have soft rock or glacial till in the substratum

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western white pine
Major understory species: Vine maple, huckleberry, salal, common beargrass, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
- Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil compaction and erosion.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restriction to planting: Rock outcrop
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Vanson—7e; Rock outcrop—8s

243—Vanson-Rock outcrop complex, 65 to 90 percent slopes

Composition

Vanson and similar soils—60 percent
Rock outcrop—20 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from igneous rock with a mantle of volcanic ash and pumice
Slope range: 65 to 90 percent
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 80 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Vanson

Typical profile

3 inches to 0—organic mat
0 to 6 inches—dark brown sandy loam
6 to 12 inches—gray gravelly loamy sand
12 to 18 inches—dark yellowish brown sandy loam
18 to 20 inches—strong brown and yellowish red very gravelly loamy sand
20 to 51 inches—yellowish brown and dark yellowish brown very gravelly loam
51 inches—hard andesite

Soil properties and qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that are warmer
- Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
- Soils that have a loamy sand surface layer
- Soils that have soft rock or glacial till in the substratum

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western white pine
Major understory species: Vine maple, huckleberry, salal, common beargrass, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
- Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil compaction and erosion.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically

Restriction to planting: Rock outcrop
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Vanson—7e; Rock outcrop—8s

244—Vanson, overblown-Rock outcrop complex, 30 to 65 percent slopes

Composition

Vanson, overblown, and similar soils—70 percent
Rock outcrop—15 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from igneous rock with a mantle of volcanic ash and pumice
Slope range: 30 to 65 percent
Elevation: 2,800 to 4,000 feet
Mean annual precipitation: 80 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Vanson, Overblown

Typical profile

0 to 5 inches—dark gray loamy sand
5 to 11 inches—dark brown sandy loam
11 to 17 inches—gray gravelly loamy sand
17 to 23 inches—dark yellowish brown sandy loam
23 to 25 inches—strong brown and yellowish red very gravelly loamy sand
25 to 56 inches—yellowish brown very gravelly loam
56 inches—hard andesite

Soil properties and qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are warmer
• Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
• Soils that have soft rock or glacial till in the substratum

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Vine maple, huckleberry, salal, common beargrass, cascade Oregongrape, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
• Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil compaction and erosion.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.

• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restrictions to planting: Rock outcrop, deposits of volcanic ash on surface
General management considerations:
• Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Vanson, overblown—7e; Rock outcrop—8s

245—Vanson, overblown-Rock outcrop complex, 65 to 90 percent slopes

Composition

Vanson, overblown, and similar soils—60 percent
Rock outcrop—20 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from igneous rock with a mantle of volcanic ash and pumice
Slope range: 65 to 90 percent
Elevation: 2,800 to 4,000 feet
Mean annual precipitation: 80 to 130 inches
Mean annual air temperature: 38 to 40 degrees F
Growing season: 90 to 140 days (28 degrees F)
Periods of snowpack: December through March

Vanson, Overblown

Typical profile

0 to 5 inches—dark gray loamy sand
5 to 11 inches—dark brown sandy loam
11 to 17 inches—gray gravelly loamy sand
17 to 23 inches—dark yellowish brown sandy loam
23 to 25 inches—strong brown and yellowish red very gravelly loamy sand
25 to 56 inches—yellowish brown very gravelly loam
56 inches—hard andesite

Soil properties and qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite

Included Areas

• Soils that have slopes of less than 65 percent
• Soils that are warmer
• Soils that have bedrock at a depth of less than 40 inches or more than 60 inches
• Soils that have a sandy loam surface layer
• Soils that have soft rock or glacial till in the substratum

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Noble fir
Minor tree species: None
Major understory species: Vine maple, huckleberry, salal, common beargrass, cascade Oregongrape, fireweed, pearly everlasting

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
• Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil compaction and erosion.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: None
Restrictions to planting: Rock outcrop, deposits of volcanic ash on surface
General management considerations:
• Plant tree roots in pre-1980 soil material. In areas that have a shallow accumulation of volcanic ash, carefully choose planting sites. If necessary, spot scalp to remove the ash. In areas that have a somewhat thicker accumulation of volcanic ash, use equipment to sufficiently remove the ash or use a power auger to mix the ash with the underlying pre-1980 soil material.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Vanson, overblown—7e; Rock outcrop—8s

246—Voight silt loam, 5 to 30 percent slopes

Composition

Voight and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Hillslopes, mountainslopes, broad ridgetops
Parent material: Residuum derived from andesite and interbedded tuff
Slope range: 5 to 30 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 60 to 90 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 130 to 160 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

1 inch to 0—organic mat
0 to 10 inches—very dark brown silt loam
10 to 37 inches—dark yellowish brown silty clay loam
37 to 60 inches—brown silty clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that are warmer or colder
• Soils that are gravelly throughout
• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that are wet

Major Uses

Woodland, watershed, wildlife habitat

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Vine maple, western swordfern, cascade Oregongrape, salmonberry, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
• Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

247—Winston silt loam, 0 to 8 percent slopes

Composition

Winston and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: River terraces
Parent material: Mixed alluvium and volcanic ash overlying glacial outwash sand, pebbles, and cobbles
Slope range: 0 to 8 percent
Elevation: 300 to 900 feet
Mean annual precipitation: 60 to 80 inches
Mean annual air temperature: 49 to 51 degrees F
Growing season: 150 to 200 days (28 degrees F)

Typical Profile

0 to 4 inches—dark brown silt loam
4 to 15 inches—dark reddish brown loam
15 to 24 inches—dark reddish brown loam
24 to 60 inches—very dark grayish brown extremely gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate to a depth of 24 inches and very rapid below this depth
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Slight
Hazard of water erosion: Slight
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that are poorly drained
• Soils that are moderately well drained
• Soils that are gravelly throughout
• Soils that are finer textured

Major Uses

Woodland, wildlife habitat, pastureland

Pastureland

General management considerations:
• Grasses and legumes grow well if they are adequately fertilized.
• The most suitable irrigation method is a sprinkler system.
• Grasses respond to nitrogen, phosphorus, and potassium. Legumes respond to lime.
• Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.
Suitable management practices:
• Provide supplemental irrigation in years of limited precipitation.
• Maintain the quality and quantity of forage by rotating grazing, mowing and harrowing to spread livestock droppings, controlling weeds, and applying fertilizer annually.

Woodland

Composition

Principal tree species: Douglas fir, western hemlock, red alder
Minor tree species: Western redcedar, bigleaf maple
Major understory species: Vine maple, western swordfern, salmonberry, salal, evergreen blackberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 2e

248—Wyant loam, 5 to 30 percent slopes

Composition

Wyant and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from tuff and tuff breccia
Slope range: 5 to 30 percent
Elevation: 900 to 1,800 feet
Mean annual precipitation: 60 to 70 inches
Mean annual air temperature: 47 to 50 degrees F
Growing season: 150 to 200 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 4 inches—very dark brown loam
4 to 12 inches—very dark grayish brown silty clay loam
12 to 26 inches—very dark grayish brown and dark yellowish brown clay loam
26 to 39 inches—dark yellowish brown and dark brown clay loam and sandy clay loam
39 to 49 inches—soft weathered tuff

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 20 to 40 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of more than 30 percent
• Soils that have bedrock at a depth of less than 20 inches or more than 40 inches
• Soils that are colder
• Soils that are gravelly throughout

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Vine maple, cascade Oregongrape, salal, western brackenfern, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None

General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

249—Wyant loam, 30 to 65 percent slopes

Composition

Wyant and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from tuff and tuff breccia
Slope range: 30 to 65 percent
Elevation: 900 to 1,800 feet
Mean annual precipitation: 60 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 150 to 200 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 4 inches—very dark brown loam
4 to 12 inches—very dark grayish brown silty clay loam
12 to 26 inches—very dark grayish brown and dark yellowish brown clay loam
26 to 39 inches—dark yellowish brown and dark brown clay loam and sandy clay loam
39 to 49 inches—soft weathered tuff

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 20 to 40 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 30 percent or more than 65 percent
- Soils that have bedrock at a depth of less than 20 inches or more than 40 inches
- Soils that are colder
- Soils that are gravelly throughout

Major Uses

Woodland, wildlife habitat, recreation

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Western hemlock, western redcedar, bigleaf maple
Major understory species: Vine maple, cascade Oregongrape, salal, western brackenfern, western swordfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

250—Xana loamy sand, 5 to 30 percent slopes

Composition

Xana and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, broad ridgetops
Parent material: Layers of pumice and volcanic ash
Slope range: 5 to 30 percent
Elevation: 2,800 to 4,200 feet
Mean annual precipitation: 120 to 130 inches
Mean annual air temperature: 37 to 39 degrees F
Growing season: 110 to 125 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

3 inches to 0—organic mat
0 to 8 inches—dark gray and dark brown loamy sand
8 to 20 inches—grayish brown and strong brown gravelly loamy sand
20 to 32 inches—brown very gravelly sandy loam
32 to 60 inches—yellowish red and reddish yellow extremely gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid to a depth of 32 inches and very rapid below this depth
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Slow
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that have bedrock at a depth of 20 to 40 inches
• Soils that do not have cinders throughout
• Soils that are warmer
• Soils that have cinders on the surface

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western white pine
Major understory species: Huckleberry, cascade Oregongrape, common beargrass, vine maple, prince's pine

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• Use designated skid trails and low-pressure ground equipment, schedule equipment operations for periods when the soil is moist, minimize tractor churning when the soil is dry, and use a brush blade during site preparation to minimize soil displacement.
• Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
• Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
• The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 6e

251—Xana loamy sand, 30 to 65 percent slopes

Composition

Xana and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes
Parent material: Layers of pumice and volcanic ash
Slope range: 30 to 65 percent
Elevation: 2,800 to 4,200 feet
Mean annual precipitation: 120 to 130 inches
Mean annual air temperature: 37 to 39 degrees F
Growing season: 110 to 125 days (28 degrees F)
Periods of snowpack: December through March

Typical Profile

3 inches to 0—organic mat
0 to 8 inches—dark gray and dark brown loamy sand
8 to 20 inches—grayish brown and strong brown gravelly loamy sand
20 to 32 inches—brown very gravelly sandy loam
32 to 60 inches—yellowish red and reddish yellow extremely gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid to a depth of 32 inches and very rapid below this depth
Available water capacity: Moderate
Potential rooting depth: 60 inches or more
Runoff: Moderate
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that have bedrock at a depth of 20 to 40 inches
- Soils that do not have cinders throughout
- Soils that are warmer
- Soils that have cinders on the surface

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir, noble fir
Minor tree species: Pacific silver fir, western white pine
Major understory species: Huckleberry, cascade Oregongrape, common beargrass, vine maple, prince's pine

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil displacement and erosion can be minimized by using appropriate cable yarding systems.
- Equipment commonly is inoperable in winter because of the snowpack.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and Pacific silver fir—periodically
Restrictions to planting: None
General management considerations:
- Seedlings growing in areas where the surface layer has been removed exhibit poor vigor.
- The risk of windthrow is higher in areas on ridgetops than in other areas of this unit.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

252—Xeno silt loam, 5 to 30 percent slopes

Composition

Xeno and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Benches, mountainslopes, broad ridgetops

Parent material: Residuum and colluvium derived from tuff with a mantle of volcanic ash
Slope range: 5 to 30 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 70 to 100 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 140 to 190 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 10 inches—very dark brown and very dark grayish brown silt loam
10 to 24 inches—dark brown and dark yellowish brown silt loam and silty clay loam
24 to 54 inches—yellowish brown, light olive brown, and light yellowish brown silt loam
54 to 64 inches—multicolored, highly weathered and fractured tuff

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 5 percent or more than 30 percent
- Soils that are warmer or colder
- Soils that are gravelly throughout
- Soil that have bedrock at a depth of 20 to 40 inches or more than 60 inches
- Soils that are finer textured
- Soils that are wet

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Cascade Oregongrape, red huckleberry, western swordfern, trailing blackberry, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

253—Xeno silt loam, 30 to 65 percent slopes

Composition

Xeno and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes, ridgetops
Parent material: Residuum and colluvium derived from tuff with a mantle of volcanic ash
Slope range: 30 to 65 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 70 to 100 inches

Mean annual air temperature: 42 to 44 degrees F
Growing season: 140 to 190 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

2 inches to 0—organic mat
0 to 10 inches—very dark brown and very dark grayish brown silt loam
10 to 24 inches—dark brown and dark yellowish brown silt loam and silty clay loam
24 to 54 inches—yellowish brown, light olive brown, and light yellowish brown silt loam
54 to 64 inches—multicolored, highly weathered and fractured tuff

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 30 percent or more than 65 percent
- Soils that are warmer or colder
- Soils that are gravelly throughout
- Soil that have bedrock at a depth of 20 to 40 inches or more than 60 inches
- Soils that are finer textured

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Cascade Oregongrape, red huckleberry, western swordfern, trailing blackberry, vine maple

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction and erosion can be minimized by using appropriate cable yarding systems.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock—readily
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

254—Xerorthents, 50 to 90 percent slopes

Composition

Xerorthents and similar soils—90 percent
Contrasting soils—10 percent

Setting

Position on landscape: Escarpments
Parent material: Colluvium derived from volcanic ash intermixed with sand, gravel, and rock fragments
Slope range: 50 to 90 percent
Elevation: 300 to 1,800
Mean annual precipitation: 50 to 80 inches
Mean annual air temperature: 46 to 50 degrees F
Growing season: 125 to 200 days (28 degrees F)

Reference Profile

0 to 4 inches—gravelly sandy loam
4 to 35 inches—gravelly sandy loam, clay loam, and silt loam
35 to 60 inches—very gravelly sand, extremely gravelly sand, and very cobbly sand

Soil Properties and Qualities

Depth class: Moderately deep to very deep
Drainage class: Well drained to excessively drained
Permeability: Moderate or moderately rapid to a depth of 35 inches and very rapid below this depth
Available water capacity: Moderate
Potential rooting depth: 20 to 60 inches or more
Runoff: Rapid or very rapid
Hazard of water erosion: Moderate or severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 50 percent
• Soils that have volcanic mudflow or bedrock at a depth of 20 inches

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir, red alder
Minor tree species: Bigleaf maple, western hemlock
Major understory species: Vine maple, salal, evergreen blackberry, rose, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil displacement and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Red alder—readily
Restriction to planting: Gravel and cobbles in the soil
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

255—Yalelake sandy loam, 5 to 30 percent slopes

Composition

Yalelake and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Hillslopes, terraces, terrace escarpments
Parent material: Glaciofluvial deposits of volcanic ash and pumice over pyroclastic material with a mantle of volcanic ash and pumice
Slope range: 5 to 30 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 80 to 120 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 125 to 200 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 12 inches—very dark grayish brown and dark brown sandy loam
12 to 26 inches—dark yellowish brown gravelly sandy loam
26 to 47 inches—yellowish brown sandy loam
47 to 60 inches—yellowish brown, stratified sand to gravelly loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained

Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 5 percent or more than 30 percent
• Soils that are colder
• Soils that are more than 35 percent rock fragments throughout
• Soils that are finer textured
• Soils that are wet

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Western redcedar, bigleaf maple
Major understory species: Vine maple, salal, western brackenfern, western swordfern, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

• To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

256—Yalelake sandy loam, 30 to 65 percent slopes

Composition

Yalelake and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Hillslopes, terraces, terrace escarpments
Parent material: Glaciofluvial deposits of volcanic ash and weathered pumice over pyroclastic material with a mantle of volcanic ash and pumice
Slope range: 30 to 65 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 80 to 120 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 125 to 200 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 12 inches—very dark grayish brown and dark brown sandy loam
12 to 26 inches—dark yellowish brown gravelly sandy loam
26 to 47 inches—yellowish brown sandy loam
47 to 60 inches—yellowish brown, stratified sand to gravelly loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent

- Soils that are colder
- Soils that are more than 35 percent rock fragments throughout
- Soils that are finer textured

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Western redcedar, bigleaf maple
Major understory species: Vine maple, salal, western brackenfern, western swordfern, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

- Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:

- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

257—Yalelake sandy loam, 65 to 90 percent slopes

Composition

Yalelake and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Hillslopes, terraces, terrace escarpments
Parent material: Glaciofluvial deposits of volcanic ash and pumice over pyroclastic material with a mantle of volcanic ash and pumice
Slope range: 65 to 90 percent
Elevation: 300 to 1,800 feet
Mean annual precipitation: 80 to 120 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 125 to 200 days (28 degrees F)

Typical Profile

2 inches to 0—organic mat
0 to 12 inches—very dark grayish brown and dark brown sandy loam
12 to 26 inches—dark yellowish brown gravelly sandy loam
26 to 47 inches—yellowish brown sandy loam
47 to 60 inches—yellowish brown, stratified sand to gravelly loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Very rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 65 percent
- Soils that are colder
- Soils that are more than 35 percent rock fragments throughout
- Soils that are finer textured

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Western redcedar, bigleaf maple
Major understory species: Vine maple, salal, western brackenfern, western swordfern, cascade Oregongrape

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

258—Zenker silt loam, 30 to 65 percent slopes

Composition

Zenker and similar soils—75 percent
Contrasting soils—25 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from sandstone
Slope range: 30 to 65 percent
Elevation: 800 to 1,800 feet
Mean annual precipitation: 70 to 110 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 225 days (28 degrees F)

Typical Profile

1 inch to 0—organic mat
0 to 10 inches—dark brown silt loam
10 to 41 inches—dark yellowish brown loam
41 to 51 inches—partly consolidated sandstone

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that have sandstone at a depth of more than 60 inches
• Soils that are finer textured
• Soils that are underlain by siltstone
• Soils that have basalt fragments in the upper 24 inches

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, Sitka spruce, bigleaf maple

Major understory species: Salmonberry, salal, cascade Oregongrape, western swordfern, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

259—Zenker silt loam, 65 to 90 percent slopes

Composition

Zenker and similar soils—80 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from sandstone
Slope range: 65 to 90 percent
Elevation: 800 to 1,800 feet
Mean annual precipitation: 70 to 110 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 200 to 225 days (28 degrees F)

Typical Profile

1 inch to 0—organic mat
0 to 10 inches—dark brown silt loam
10 to 41 inches—dark yellowish brown loam
41 to 51 inches—partly consolidated sandstone

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: Moderate
Potential rooting depth: 40 to 60 inches
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 65 percent
• Soils that have sandstone at a depth of less than 40 inches or more than 60 inches
• Soils that are finer textured
• Soils that are underlain by siltstone
• Soils that have basalt fragments in the upper 24 inches

Major Uses

Woodland, wildlife habitat, watershed

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Red alder, western redcedar, Sitka spruce, bigleaf maple
Major understory species: Salmonberry, salal, cascade Oregongrape, western swordfern, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil

damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

260—Zymer sandy loam, 30 to 65 percent slopes

Composition

Zymer and similar soils—70 percent
Contrasting components—30 percent

Setting

Position on landscape: Mountainslopes
Parent material: Residuum and colluvium derived from volcanic ash and basic igneous rock with a mantle of ash and some pumice fragments
Slope range: 30 to 65 percent
Elevation: 500 to 1,800 feet
Mean annual precipitation: 90 to 120 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 150 to 200 days (28 degrees F)

Typical Profile

1 inch to 0—organic mat
0 to 10 inches—very dark grayish brown sandy loam
10 to 20 inches—dark yellowish brown gravelly sandy loam
20 to 26 inches—dark yellowish brown very gravelly loam
26 to 60 inches—yellowish brown and strong brown extremely gravelly loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

• Soils that have slopes of less than 30 percent or more than 65 percent
• Soils that are colder
• Soils that are finer textured
• Rock outcrop
• Soils that are sandy loam throughout
• Soils that are wet

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Vine maple, salal, cascade Oregongrape, western swordfern, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.

Roads, trails, and landings

• Suitable surfacing is required for year-round use of logging roads.
• Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
• Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
• Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
• Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restrictions to planting: None
General management considerations:
• Unwanted competing vegetation can be controlled by mechanical or chemical methods.
• Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 7e

261—Zymer-Rock outcrop complex, 65 to 90 percent slopes

Composition

Zymer and similar soils—55 percent
Rock outcrop—25 percent
Contrasting soils—20 percent

Setting

Position on landscape: Mountainslopes, escarpments
Parent material: Residuum and colluvium derived from volcanic ash and basic igneous rock with a mantle of ash and some pumice fragments
Slope range: 65 to 90 percent
Elevation: 500 to 1,800 feet
Mean annual precipitation: 90 to 120 inches
Mean annual air temperature: 48 to 50 degrees F
Growing season: 150 to 200 days (28 degrees F)

Zymer

Typical profile

1 inch to 0—organic mat
0 to 10 inches—very dark grayish brown sandy loam
10 to 20 inches—dark yellowish brown gravelly sandy loam
20 to 26 inches—dark yellowish brown very gravelly loam
26 to 60 inches—yellowish brown and strong brown extremely gravelly loam

Soil properties and qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Rapid
Hazard of water erosion: Severe
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Rock Outcrop

Description of areas: Cliffs or dikes of andesite

Included Areas

• Soils that have slopes of less than 65 percent
• Soils that are colder
• Soils that are finer textured
• Soils that have bedrock at a depth of less than 60 inches
• Soils that are sandy loam throughout

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Douglas fir, western hemlock
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Vine maple, salal, cascade Oregongrape, western swordfern, western brackenfern

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—unsafe, causes excessive soil damage and erosion; cable yarding systems—suitable

Equipment use

• Soil compaction, displacement, and erosion can be minimized by using appropriate cable yarding systems.
• Avoiding areas of Rock outcrop forces yarding or skidding paths to converge, which increases the risks of soil compaction and erosion.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.
- Midslope roads are difficult to maintain, and they require large cuts and fills that remove land from production.
- Establishing water bars and plant cover reduces the risk of erosion on steep yarding paths, skid trails, unsurfaced roads, and firebreaks.

Silviculture

Potential for natural regeneration: Western hemlock and red alder—readily
Restriction to planting: Rock outcrop
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: Zymer—7e; Rock outcrop—8s

262—Zynbar silt loam, 5 to 30 percent slopes

Composition

Zynbar and similar soils—85 percent
Contrasting soils—15 percent

Setting

Position on landscape: Mountainslopes
Parent material: Glaciofluvial deposits of volcanic ash and weathered andesite with a mantle of ash
Slope range: 5 to 30 percent
Elevation: 1,800 to 2,800 feet
Mean annual precipitation: 70 to 100 inches
Mean annual air temperature: 42 to 44 degrees F
Growing season: 140 to 190 days (28 degrees F)
Periods of snowpack: Frequency—occasional; months—November through April

Typical Profile

1 inch to 0—organic mat
0 to 9 inches—very dark grayish brown silt loam
9 to 45 inches—dark brown and dark yellowish brown gravelly silt loam
45 to 60 inches—dark yellowish brown silt loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Available water capacity: High
Potential rooting depth: 60 inches or more
Runoff: Medium
Hazard of water erosion: Moderate
Depth to seasonal high water table: More than 5 feet
Hazard of flooding: None

Included Areas

- Soils that have slopes of less than 5 percent or more than 30 percent
- Soils that are warmer or colder
- Soils that do not have gravel
- Soils that are more than 35 percent rock fragments
- Soils that have bedrock at a depth of less than 60 inches
- Soils that are cobbly, very cobbly, or extremely cobbly throughout

Major Uses

Woodland, wildlife habitat, watershed, recreation

Woodland

Composition

Principal tree species: Western hemlock, Douglas fir
Minor tree species: Western redcedar, red alder, bigleaf maple
Major understory species: Vine maple, western swordfern, western brackenfern, cascade Oregongrape, red huckleberry

Harvesting practices

Suitability of logging systems: Wheeled and tracked equipment—suitable; cable yarding systems—optional

Equipment use

- To minimize soil compaction, use designated skid trails and schedule equipment operations for periods in summer and fall when the soil is dry.
- Equipment use is limited by the occasional periods of snowpack in winter.

Roads, trails, and landings

- Suitable surfacing is required for year-round use of logging roads.
- Use of water bars; relief culverts; road surface

insloping, outsloping, or crowning; sediment traps; energy dissipators; and undulating road grades reduces the risks of erosion and sedimentation.
- Establishing plant cover in disturbed areas, such as road cuts and fills, reduces the risks of erosion and sedimentation.

Silviculture

Potential for natural regeneration: Western hemlock—periodically
Restrictions to planting: None
General management considerations:
- Unwanted competing vegetation can be controlled by mechanical or chemical methods.
- Leaving buffer strips of natural vegetation along major watercourses helps to maintain streambank stability, wildlife habitat, and water quality.

Interpretive Groups

Capability subclass: 4e

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed for each soil, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading “Detailed Soil Map Units.”

About 11,900 acres of the survey area is used for producing high-value cash crops, and about 38,300 acres is used for growing forage crops (USDA 1987a). Cash crops commonly produced in the area include nursery stock, carrots, ornamental bulbs, strawberries, raspberries, blackberries, blueberries, flowers and ornamental greens for cutting, and specialty small grain. Forage crops include field corn, mixtures of grasses and legumes, greenchop, and silage.

Hybrid cottonwood trees are grown in a short rotation (7 years) for pulpwood fiber (fig. 7). These trees are becoming an increasingly more important crop in areas of soils on flood plains. At present about 500 acres is used for growing these trees.

Agricultural crop production is best suited to soils on flood plains and low terraces adjacent to riparian areas. These soils commonly have a high water table in winter, but it also can be present during the growing season. Most agricultural soils are protected from flooding by dikes and upriver-controlled release of water from hydroelectric dams.

The production of pasture and hay on upland terraces and steeper hillslopes commonly is limited by a shorter growing season and lack of available soil moisture late in summer because of the surface drainage patterns in these areas. More information on specific soils is given in the section “Detailed Soil Map Units.”

Proper management of plant nutrients and water increases the production and quality of crops on most soils. The soils used for crops are neutral to strongly acid. Applications of lime may be needed to reduce the acidity of the soils and increase the availability of nutrients for most crops. A soil nutrient evaluation is useful in balancing current soil nutrient levels with the needs of the crop grown. Common sources of plant nutrients that can be added to the soil include animal manure, commercial fertilizer, composted crop residue, by-products from manufacturing processes,

Figure 7.—Hybrid cottonwood plantation in an area of Caples silty clay loam, 0 to 3 percent slopes, in center.

and biosolids from organic waste processing. The local office of the Natural Resources Conservation Service can provide assistance in determining the proper nutrient balance for specific soils and crops. The latest information on crop production is available from various sources, including the local office of the Natural Resources Conservation Service or of the Cooperative Extension Service and private agricultural consultants.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects;

favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For example, each cutting of grass-legume hay should coincide with the emergence of the seed head and the harvested forage should be removed from the field as soon as possible. Using the hayfields as pasture in spring and early in summer under an intensive grazing system effectively delays the emergence of the seed head until the weather is most reliable for harvesting.

High-level management of pasture includes use of an intensive grazing system and removal of livestock when the soils are saturated to prevent damage to forage plants and to minimize compaction of the soils. A series of paddocks is used to rotate livestock during the grazing season.

Generally, livestock are allowed onto pastures in spring when the forage is about 6 to 8 inches tall and the soil is dry enough to minimize damage by trampling. The forage is grazed to a level that does not slow down regrowth, generally to a height of no less than 3 inches. The plants then are rested until the regrowth is 6 to 8 inches tall. Harrowing, fertilizing, and other management practices are applied at the beginning of the rest period. The paddocks should be small enough that livestock can deplete the forage in a week or less. The cycle of grazing and rest is repeated until the end of the growing season, generally about November 1. Livestock are then moved to a well drained confinement area or pasture for the winter. Applicable cropland management practices should be used when reseeding pasture.

Since the most productive agricultural soils and critical aquifer recharge areas are on alluvial bottom land, management of nutrients and pesticides is a concern. Most pesticides and plant nutrients are water soluble or attach to soil particles that are subject to being dislodged during farming activities; thus, there is a risk of contamination of water. Applicable conservation practices include construction of pesticide mixing stations, nutrient management, waste utilization, pesticide management, adherence to label requirements for pesticide application, utilization of fertilizer management guidelines, hazardous waste recycling, and irrigation water management.

The estimated yields in the table reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in the table are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops (USDA 1961). Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by numerals 1 through 8. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have few limitations that restrict their use.

Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation.

Class 7 soils have very severe limitations that make them unsuitable for cultivation.

Class 8 soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter,

e, w, s, or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of the map units in this survey area is given in the section "Detailed Soil Map Units" and in table 5.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, woodland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 66,430 acres in the survey area, or about 9 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county, but most are in general soil map units 1, 2, 3, and 5. About 18,000 acres of this prime farmland is used for crops. The crops grown are used mainly as feed for beef and dairy cattle. Some crops are grown for commercial use. These include sweet corn, peas, and carrots, which are used by the frozen food industry. Other commercial crops include raspberries, flower bulbs, and blueberries.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in this section. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units." The map units that meet the requirements for prime farmland are:

17 Caples silty clay loam, 0 to 3 percent slopes (if drained and either protected from flooding or not frequently flooded during the growing season)
21 Centralia silt loam, 0 to 8 percent slopes
25 Cinebar silt loam, 0 to 5 percent slopes
32 Clato silt loam, 0 to 3 percent slopes
47 Edgewick silt loam, 0 to 3 percent slopes
50 Ferteg silt loam, 0 to 8 percent slopes
54 Germany silt loam, 0 to 8 percent slopes
65 Godfrey silt loam, 0 to 3 percent slopes (if drained)
67 Greenwater loamy sand, overblown, 0 to 8 percent slopes (if irrigated)
68 Greenwater gravelly loamy sand, 0 to 8 percent slopes (if irrigated)
69 Greenwater fine sandy loam, 0 to 8 percent slopes (if irrigated)

100 Kelso silt loam, 0 to 8 percent slopes
104 Kosmos silt loam, 0 to 3 percent slopes (if drained)
105 Lacamas silt loam, 0 to 6 percent slopes (if drained)
123 Mart silt loam, 0 to 8 percent slopes
127 Maytown silt loam, 0 to 3 percent slopes
130 Minniece silt loam, 0 to 8 percent slopes (if drained)
141 Newberg fine sandy loam, 0 to 3 percent slopes
142 Olequa silt loam, 0 to 8 percent slopes
146 Olympic silt loam, 2 to 8 percent slopes
160 Pilchuck loamy fine sand, 0 to 8 percent slopes (if irrigated)
166 Prather silty clay loam, 0 to 5 percent slopes
176 Salkum silt loam, 2 to 8 percent slopes
179 Sara silt loam, 0 to 8 percent slopes
182 Sara silty clay loam, 0 to 8 percent slopes
185 Sauvola loam, 0 to 8 percent slopes
192 Seaquest silt loam, 0 to 8 percent slopes
195 Semiahmoo muck, 0 to 1 percent slopes (if drained)
199 Snohomish silty clay loam, 0 to 1 percent slopes (if drained)
208 Stella silt loam, 3 to 8 percent slopes
247 Winston silt loam, 0 to 8 percent slopes

Woodland

By Gregory S. Fisher, area forester, Natural Resources Conservation Service.

This survey area lies within one of the best timber-growing regions in North America. The favorable climate and fertile soils result in a high productive potential. About 87 percent of the area is forested. About 67 percent of this woodland is owned by the forest industry, and 18 percent is owned by private, nonindustrial operators. The remaining 15 percent is State and Federal woodland.

Woodland Zones

The survey area can be divided into four major woodland zones. These zones are based on naturally occurring overstory species, climate, and soil characteristics. The dominant species are given in the zone name, but isolated individual trees or nearly pure stands of other species commonly occur. The boundaries between the zones consist of gradual changes in native vegetation and soils rather than precise divisions. With few exceptions, each woodland zone is characterized by certain soil series and detailed soil map units; that is, any given soil will occur only in a specific zone. A brief description of each zone is given in the following paragraphs.

The *Douglas fir/red alder zone* is the most extensive zone in the survey area. This zone is at an elevation of near sea level to 1,800 feet. It consists mainly of deep and very deep, poorly drained to somewhat excessively drained soils. It has mild temperatures with a growing season (28 degrees F) of 150 to 240 days. The mean annual precipitation is 38 to 70 inches, but only a limited amount of soil moisture is available for tree growth in summer. Associated tree species include western redcedar, bigleaf maple, western hemlock, Sitka spruce, grand fir, black cottonwood, Pacific madrone, and bitter cherry. Common understory species include salal, cascade Oregongrape, western brackenfern, western swordfern, western hazel, vine maple, salmonberry, red huckleberry, trailing blackberry, Douglas spirea, Pacific trillium, northern twinflower, violet, and bedstraw. Some areas of this zone are used for the production of Christmas trees. Douglas fir, noble fir, and grand fir are the most common species grown for this use. Some of the soils in this zone are those of the Baumgard, Buckpeak, Caples, Centralia, Clato, Germany, Greenwater, Kalama, Kelso, Olympic, Pilchuck, Raught, Schneider, Seaquest, and Speelyai series.

The main management concerns for this zone are restricted harvesting on the finer textured soils during the rainy season, high seedling mortality on the poorly drained soils, and invasion of brush and red alder into cutover areas, which can prevent the establishment of planted tree seedlings. Management practices generally include clear-cut harvesting when stands reach about 60 years of age. Site preparation needed for tree planting includes piling and burning logging slash and brush or use of prescribed burning. Douglas fir seedlings are handplanted on well drained soils during the first planting season after the site is prepared. Control of competing vegetation, primarily red alder and brush, commonly is needed within a few years after planting. Thinning and fertilizing increase the commercial yields of the intermediate and final harvests.

The *Douglas fir/western hemlock/red alder zone* is at an elevation of 300 to 1,800 feet. It consists mainly of moderately deep to very deep, well drained soils. It has mild temperatures with a growing season (28 degrees) of 150 to 240 days. The mean annual precipitation is 70 to 120 inches, and an adequate amount of soil moisture is available for tree growth in summer. Associated tree species include western hemlock, bigleaf maple, grand fir, and Sitka spruce. Common understory species include western swordfern, cascade Oregongrape, salal, red huckleberry, salmonberry, vine maple, western

brackenfern, and Oregon oxalis. Some of the soils in this zone are those of the Bunker, Cinebar, Gobar, Katula, Lytell, Yalelake, Zenker, and Zymer series.

Management concerns and practices needed for this zone are similar to those of the Douglas fir/red alder zone. A major difference, however, is the method of cutting needed to allow for natural reforestation of western hemlock. Western hemlock is more tolerant of shade than is Douglas fir, and brush encroachment is less of a concern. Natural stands of western hemlock generally produce more total wood fiber than do natural stands of Douglas fir.

The *western hemlock/Douglas fir zone* is at an elevation of 1,800 to 2,800 feet. It consists mainly of moderately deep to very deep, well drained soils. It has cool temperatures with a growing season (28 degrees) of 125 to 190 days. The mean annual precipitation is 70 to 135 inches, and an adequate amount of soil moisture is available for tree growth in summer. Associated tree species include red alder, western redcedar, and bigleaf maple. Common understory species include vine maple, cascade Oregongrape, red huckleberry, western swordfern, trailing blackberry, salal, and western brackenfern. Some of the soils in this zone are those of the Beigle, Cinnamon, Domell, Hoffstadt, Pheeney, and Swift series.

Management concerns and practices needed for this zone are essentially the same as those for the Douglas fir/western hemlock/red alder zone; however, occasional periods of snowpack limit harvesting. Because of the cooler temperatures and shorter growing season, red alder is a less vigorous invader in cutover areas. Western hemlock is dominant in many areas of this zone, mainly because of the woodland management practices used in the early 1900's. Areas of old growth stands were harvested but were not replanted to Douglas fir. An abundance of seed-producing western hemlock was left after cutting, and it quickly became established in nearly pure stands.

The *western hemlock/Douglas fir/Pacific silver fir zone* is divided into two components—a small Coast Range component in the extreme western part of the survey area and a larger Cascade Range component in the eastern part. The native vegetation is similar in both of these areas, but the soils and climate are quite different.

The Coast Range component of this zone is at an elevation of 1,800 to 2,600 feet. It consists mainly of moderately deep to very deep, well drained soils. It has cool temperatures with a growing season (28 degrees) of 150 to 180 days. The mean annual precipitation is 80 to 110 inches, and an adequate amount of soil moisture is available for tree growth in summer. Associated tree species include red alder, Sitka spruce, bigleaf maple, and western redcedar. Common understory species include salmonberry, salal, western swordfern, western brackenfern, trailing blackberry, red huckleberry, and vine maple. Soils of the Lates and Murnen series are in the coastal component. Woodland management concerns and practices needed are similar to those of the western hemlock/Douglas fir zone.

The Cascade Range component is at an elevation of 2,800 to 4,500 feet. It consists mainly of moderately deep to very deep, well drained and excessively drained soils. It has cool temperatures with a growing season (28 degrees) of 70 to 160 days. The mean annual precipitation is 80 to 130 inches, and an adequate amount of soil moisture is available for tree growth in summer. Associated tree species include noble fir, western white pine, western redcedar, lodgepole pine, and Alaska cedar. Common understory species include common beargrass, vine maple, cascade Oregongrape, salal, kinnikinnick, deerfern, prince's pine, huckleberry, lupine, bunchberry dogwood, and penstemon. Some of the soils in this component are those of the Hatchet, Lonestar, Polepatch, Reichel, Stahl, and Vanson series.

The main management concerns for this component are restricted access because of wind and snowpack and seedling mortality as a result of the adverse climate. Management practices needed generally consist of clearcutting and disposing of excess woody material and brush, commonly by prescribed burning. In some areas the slash is left on the soil to protect the seedlings. Site preparation generally is followed by hand-planting of noble fir seedlings. If seed trees are present, natural reforestation of cutover areas by western hemlock occurs periodically. Reforestation of Pacific silver fir has occurred in some of the old growth stands; however, damage to these seedlings by equipment during harvesting or by sunscald following removal of the overstory can result in poor-quality trees or sparse stands.

The woodland zones were based on naturally occurring tree species and soil conditions existing prior to the 1980 eruption of Mount St. Helens. In some areas, the soils and natural vegetation were affected by the eruption (Duncan and Steinbrenner 1971). Trees were killed by the lateral blast in the northeastern corner of the survey area and by mudflows along the North Fork and South Fork of the Toutle River (fig. 8) and the lower part of the Cowlitz River (Lombard and others 1981). The soils in the

Figure 8.—Woodland destroyed by mudflows in the Toutle River Valley.

northeastern corner were subsequently covered by varying amounts of volcanic ash, which has been altered by erosion and sedimentation.

The soils in this survey that are identified as an overblown phase and the Elkprairie soils are those impacted by the lateral blast and deposition of volcanic ash. The salvage has been logged from most of these soils, except in the area established as the Volcanic National Monument. The soils at an elevation of less than 2,800 feet have been handplanted to Douglas fir, and those at an elevation of more than 2,800 feet have been handplanted to noble fir. Key to planting is placing the tree roots in pre-1980 soil material. Shallow accumulations of ash either are not a concern for planting or require only minor spot scalping to remove an amount sufficient for planting. In areas of somewhat deeper accumulations, equipment can be used to scalp the ash or power augers can be used to mix the ash with the underlying soil material. Seedling survival generally is good, and productivity is expected

to be similar to that prior to the eruption. The abundance of forest understory species is increasing gradually. Most of the first plants to appear originated as sprouts from old rootstock and from seed deposited by wind from adjacent, unaffected areas. Soils that have deep accumulations of ash, such as those of the Elkprairie series, are much more difficult to reforest because the roots must initially grow in the droughty, nutrient-deficient ash. Seedling mortality is very high in areas planted to noble fir and lodgepole pine. Unless soil amendments are used, productivity is expected to be low for many years. Because the ash in these areas is too deep for rootstock to sprout, natural vegetation is becoming established more slowly. Natural revegetation in the interior of the area affected by the eruption is limited because of the lack of a nearby seed source.

Soils representative of the recent mudflows are those of the Carrolls, Cowlitz, Delameter, Mountsolo, Panamaker, and Studebaker series. Some small trial areas have been planted to black cottonwood cuttings, red alder, and conifers, but large-scale attempts have not been made to handplant the mudflows. The mudflows tend to be very wet during the rainy season, droughty in summer, and deficient in nutrients. Red alder has naturally reseeded in some areas along the lower part of the Toutle River, where a seed source is present. Within its range, red alder is probably the tree species best suited to the mudflows because of its tolerance of drought and wetness and its nitrogen-fixing capacity. In the short term, productivity of the mudflows is expected to be low. Once sufficient time has past for new soil material to develop, these areas are expected to support conifers as do the older Mount St. Helens mudflows of the Forsyth, Polepatch, and Speelyai series.

Spoil dredged from the Cowlitz River has been placed on the recent mudflows. The spoil is deficient of nutrients and generally is very coarse textured. It is extremely droughty, and natural revegetation has been slow. Scotch broom is one of the most successful invaders. Red alder has re-established best in the wetter areas along drainageways. Scattered black cottonwood trees have become established. Most tree species planted in spoil material require supplemental irrigation and applications of soil amendments.

Woodland Management and Productivity

The success or failure of many management practices can be predicted through knowledge of the properties of the various soils on which trees grow. Species adaptability, potential productivity, erosion hazard, seedling mortality, windthrow hazard, and problems associated with equipment use can be inferred from soils information.

For each soil suitable for the production of commercial trees, information on composition; harvesting practices; equipment limitations; roads, trails, and landings; and silviculture is given in the section “Detailed Soil Map Units.” The principal tree species are those that cover at least 10 percent of the geographical range of a soil, and the minor tree species are those that cover less than 10 percent. They generally are listed in order of abundance. Major understory species typically grow beneath the main forest canopy. Harvesting activities or other disturbances can greatly affect the amount and composition of the understory vegetation. The plant communities destroyed by the 1980 eruption of Mount St. Helens were much more diverse than those presently on the affected soils.

Under *harvesting practices* is information on the suitability of wheeled and tracked equipment and cable yarding systems. Steepness of slope is the primary consideration. Both the timing of use and the applicable system should be considered to minimize the impact to the soil.

Under *equipment use* and *roads, trails, and landings* are practices that can be used to minimize or prevent damage to the soil.

The *silviculture* section gives information on the natural regeneration of native tree species, soil-related restrictions to planting, and other management considerations specific to the soil. The *potential for natural regeneration* is the likelihood of natural re-establishment of tree species if a suitable seed source is present. A rating of “readily” indicates that the species is likely to naturally regenerate within 1 year to 5 years after a significant seedbed disturbance, and a rating of “periodically” indicates that regeneration is likely to occur within 5 to 10 years. *Restrictions to planting* indicates the inherent soil characteristics that hinder planting of tree seedlings. The presence of gravel, stones, or boulders in the soil and a high water table during the planting season are examples. Use of proper planting techniques and timing can be crucial to seedling survival.

The tables in this section can be used by woodland owners or forest managers in planning the use of soils for production of commercial trees. Table 6 provides information on woodland management concerns and productivity potential for each soil suitable for the production of commercial trees. Table 7 gives the 50-year and 100-year site index and the culmination of the mean annual increment for selected tree species. Table 8 provides information on selected management concerns on woodland, and table 9 provides

information on road construction in areas of woodland.

Table 6.—This table lists the ordination symbol for each soil suitable for the production of commercial trees. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for the most productive tree species. The number indicates the volume, in cubic meters per hectare per year, which the species can produce in a fully-stocked, unmanaged stand. The Scribner board feet per acre per year can be estimated by multiplying by 60 the cubic meters per hectare per year. The number 1 indicates low potential productivity; 2 or 3, moderate; 4 or 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil, either seasonally or year round; *D*, restricted rooting depth; *S*, sandy texture; and *F*, a high content of coarse fragments that are more than 0.1 inch or less than 10 inches in diameter. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the letter that denotes the most limiting characteristic is used.

In the table, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard indicates the potential for sheet and rill erosion if the soil surface is unprotected. Ratings of the erosion hazard are based on the properties of the soil, the percent of the slope, and the climate. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, and soil wetness. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. A rating of *moderate* indicates that equipment use is restricted seasonally by one or more soil factors. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the slope is more than 30 to 40 percent, use of wheeled and tracked equipment is unsafe. Cable yarding systems are safer, and use of these systems minimizes damage to the soil. Wetness, especially in areas of fine textured soils, can severely limit the use of equipment and make harvesting practical only during the dry period in summer.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The ratings are for properly planted, healthy, dormant seedlings from good stock or for natural regeneration that germinates during a period of sufficient soil moisture. Plant competition and other factors such as damage by animals are not considered in the ratings. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Droughtiness of the surface layer, especially on south- and southwest-facing slopes; soil wetness; and environmental conditions, such as on ridgetops, affect seedling mortality. Planting at more closely spaced intervals, using larger than normal stock, special site preparation, surface drainage, or replanting may be necessary.

Windthrow hazard ratings consider the effect of soil characteristics on the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that under normal conditions few trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods. The main restrictions that affect rooting are a seasonal high water table, the depth to bedrock or other limiting layers, and loose soil material in the surface layer and subsoil. Trees in exposed areas, such as on ridgetops, on the windward side of hillslopes, and in localized wind chutes, are particularly susceptible to windthrow. If the rating is moderate or severe, care in thinning the stands, periodic salvage of windthrown trees, and adequate

roads and trails for salvage operations may be needed.

Plant competition ratings indicate the degree to which undesirable woody species, including shrubs and red alder, are expected to invade and grow when openings are made in the tree canopy. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied. These include careful and thorough cleanup after harvesting and use of mechanical or chemical treatment to retard the growth of unwanted vegetation. Generally, the key to predicting the degree of plant competition is the quantity and proximity of a seed source of undesirable plants or the quantity of unwanted brush rootstock that will sprout after harvesting and site preparation.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a site index and as a volume number. The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. The species are listed in order of abundance. They occur throughout the geographical range of the soil. The plant communities on the soils affected by the 1980 eruption of Mount St. Helens were much more diverse than those presently on these soils.

The *volume of wood fiber*, a number, is the yield likely to be produced by the most important trees species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Suggested trees to plant are those that are suitable for commercial wood production and generally are available at a local nursery. Also included are species that will regenerate readily if a seed source is present.

Table 7.—This table shows, for each soil that is suitable for the production of commercial trees, the potential production of dominant and codominant tree species. The *mean site index* refers to the height, in feet, that the fastest-growing dominant and codominant trees can be expected to reach in 50 or 100 years. It is measured at breast height, or 4.5 feet above the ground. The site index for Douglas fir and western hemlock is based on a 50-year and 100-year site curve. The site index for red alder is based on a 50-year site curve (Barnes 1962, King 1966, McArdle and others 1961, Wiley 1978, Worthington and others 1960). Site indexes for each soil are an average taken from plot data or are estimated from data for similar soils.

Generally, the higher the site index, the higher the potential of the soil to produce wood fiber. A site index for a specific species on a soil should only be compared to site indexes for the same species on other soils. Site indexes were not estimated for minor tree species or species for which suitable site index publications are not available. Soils drastically altered by the 1980 eruption of Mount St. Helens were not assigned site indexes.

The *estimated growth of unmanaged stands at culmination*, expressed in cubic feet per acre at the indicated age, refers to the highest average annual growth rate of unmanaged, even-aged stands. It is based on the mean site index and is calculated from yield tables (Barnes 1962, McArdle and others 1961, Worthington and others 1960). The Scribner board feet per acre per year can be estimated by multiplying by 4 the cubic feet per acre at culmination. The board feet culmination occurs at an older age.

Table 8.—This table shows, for each soil suitable for the production of commercial trees, selected woodland management concerns. If the rating is moderate or severe, more information is given in the section “Detailed Soil Map Units.”

Physical limitations refer to the soil characteristics that limit the use of equipment, either year round or seasonally. *None* indicates that equipment use normally is not restricted in kind or time of year because of soil factors. *Wetness* indicates a seasonal or year-round high water table. *Muddiness* indicates a seasonal limitation for equipment use on finer textured soils that are high in content of silt or clay. *Slope* indicates that use of wheeled or tracked equipment is unsafe and causes excessive soil damage. Use of more specialized and commonly more costly equipment is needed on slopes of more than 30 percent. *Occasional snowpack* indicates that access and use of equipment generally are limited for relatively short periods of time. *Winter snowpack* indicates that access and use of equipment commonly are restricted for extended periods of time.

Compaction hazard when soil is moist is the

susceptibility to compaction as a result of equipment use during wet or moist conditions. The soil properties considered in the ratings include soil texture; thickness of the organic horizon; rock fragment content, size, and shape; and soil structure. Compaction decreases the void spaces in the soil and thus reduces the amount of air and water available for plant growth.

Displacement hazard when soil is dry is the susceptibility of the soil to displacement as a result of repeated equipment use. Considered in the rating is soil texture, content of coarse fragments, and thickness of the organic layer. Displacement can occur when a soil is mechanically gouged, scraped, or pushed from its natural position. Damage to moist soils can also occur, but use of equipment on dry, loose soil is most damaging. Soil displacement results in a reduction of the organic-rich part of a soil and alters the hydrologic soil characteristics. A *slight* rating indicates that equipment use would displace a minimal amount of the soil surface, a *moderate* rating indicates that equipment use should be restricted to designated areas, and a *severe* rating indicates that all equipment use should be limited to specific periods and specific kinds of equipment should be used.

Soil stability ratings refer to the stability of a soil and the underlying material after they have been disturbed by the construction of roads and landings and by timber harvesting activities. The stability of a soil affects the potential for mass movement. *Stable* indicates that slope stability is not a concern if road construction is carefully planned and proper timber harvesting techniques are used. *Unstable* indicates that slope stability can be a concern. Commonly, but not always, problems related to the instability of the slope can be prevented or minimized by applying current road construction technology.

Hazard of soil damage by fire is the susceptibility of the soil to damage by fire. Thickness of the organic layer and surface layer, steepness and aspect of slope, and soil texture are considered in the rating. This qualitative rating can be used as a guide for the expected impact of hot surface fires on the soil and biological conditions. Intense heat can reduce the nutrient level of the surface layer, alter soil structure, and increase the potential for erosion. A rating of moderate or severe indicates that hot prescribed burns can be detrimental to the soil.

Table 9.—This table gives interpretive ratings for the condition of unsurfaced roads and skid trails during wet periods, the availability of rock for roads, and the hazard of cut and fill erosion.

The *condition of unsurfaced roads and skid trails during wet periods* indicates the general characteristics of the soil. Implied in the rating is the type of traffic the soil can bear and the need for a rock base. The ratings are *soft, slippery, sticky*, and *firm*. A rating of *firm* indicates the presence of sufficient coarse textured soil material to provide an adequate surface for equipment.

The *availability of rock for roads* indicates the accessibility of suitable rock for use as base rock. *Readily* indicates that the soil material above the rock is less than 10 feet thick. *Not readily* indicates that suitable rock is not available or the soil material above the rock is more than 10 feet thick.

Hazard of cut and fill erosion refers to the susceptibility of the exposed soil material to erosion. Considered in the rating are soil properties, slope, and climatic conditions. A rating of *slight* indicates that erosion control measures generally are not needed. A rating of *moderate* indicates a need for onsite assessment to determine whether erosion control measures should be implemented. A rating of *severe* indicates that erosion control measures probably are needed and should be implemented as soon as possible.

Recreation

The soils of the survey area are rated in table 10 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In the table, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in the table can be supplemented

by other information in this survey, for example, interpretations for septic tank absorption fields in table 13 and interpretations for dwellings without basements and for local roads and streets in table 12.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

The potential for development or enhancement of wildlife habitat is good on most soils in the survey area. The soils in general soil map units 1, 2, and 3 historically were cleared for agricultural use. These soils generally have good potential for openland wildlife habitat where odd areas, fence rows, and wetland and riparian areas are interspersed with farmland. Agricultural forage and grain crops provide good feeding areas for deer, elk, and waterfowl.

The soils in general soil map units 4 through 21 dominantly support coniferous forests that provide habitat for woodland wildlife. Many species, such as deer and elk, benefit from forest management practices that result in interspersed openings in the forests and early successional stages. Some species, such as the northern spotted owl, are highly dependent on undisturbed tracts of old growth forest.

Numerous wetland areas and streams are throughout the survey area. These areas are of highest value for fish and wildlife if they are undisturbed. Many of these areas have been adversely affected by logging, farming, and urban development.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 11, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are tall fescue, orchardgrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are brackenfern, swordfern, lupine, dandelion, miner's lettuce, and trillium.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are red alder, vine maple, bigleaf maple, and Pacific dogwood.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are Douglas fir, western hemlock, and western redcedar.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are salmonberry, Oregongrape, salal, huckleberry, snowberry, and elderberry.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are skunkcabbage, smartweed, rushes, sedges, and cattail.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include California quail, pheasant, robin, meadowlark, song sparrow, crow, killdeer, and rabbit.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include band-tailed pigeon, ruffed grouse, mountain beaver, woodpeckers, black-tailed deer, squirrels, and black bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, kingfisher, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils

or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 12 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 13 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

The table also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

The table gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and

boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 14 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 15 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to

supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 16 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading “Soil Series and Their Morphology.”

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM 1993, PCA 1973) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO 1986, PCA 1973).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area

and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical Properties

Table 17 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K_{sat}) refers to the ability of a soil to transmit water or air. The term “permeability,” as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 17, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and

tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

Table 18 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased

dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Soil and Water Features

Tables 19 and 20 give estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

In table 19, *hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

The table gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in the table are depth to the seasonal high water table, the kind of water table, and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. “More than 6.0” indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

In table 20, a *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that

restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(USDA 1975, USDA 1987b).* Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 21 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Hapludalfs.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” *(USDA 1993)* and the “National Soil Survey Handbook” (Available online at http://soils.usda.gov/technical/handbook/). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” *(USDA 1975)* and in “Keys to Soil Taxonomy” *(USDA 1987b)*. Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section “Detailed Soil Map Units.”

Astoria Series

The Astoria series consists of very deep, well drained soils on hillslopes. These soils formed in residuum derived dominantly from highly weathered marine siltstone. Slope is 5 to 30 percent. Elevation is 800 to 1,400 feet. The mean annual precipitation is 80 to 110 inches, the mean annual air temperature is

about 49 degrees F, and the growing season is 200 to 240 days.

These soils are classified as medial, mesic Andic Haplumbrepts.

Typical pedon of Astoria silt loam, 5 to 30 percent slopes; about 12 miles northwest of Castle Rock; 2,600 feet south and 1,900 feet west of the northeast corner of sec. 23, T. 10 N., R. 4 W.

Oe—3 inches to 0; partially decomposed needles, leaves, twigs, cones, bark chips, and roots; abrupt smooth boundary.

A—0 to 15 inches; dark brown (10YR 3/3) silt loam, brown (7.5YR 4/4) dry; strong medium and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many very fine pores; strongly acid; clear smooth boundary.

Bw1—15 to 21 inches; dark yellowish brown (10YR 3/4) silty clay loam, strong brown (7.5YR 5/6) dry; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many very fine pores; strongly acid; clear wavy boundary.

Bw2—21 to 40 inches; dark yellowish brown (10YR 4/6) silty clay loam, strong brown (7.5YR 5/6) dry; moderate medium subangular blocky structure; slightly hard, firm, sticky and plastic, weakly smeary; common fine, medium, and coarse pores; common fine pores; 5 percent soft angular siltstone pebbles; strongly acid; clear wavy boundary.

Bw3—40 to 60 inches; dark yellowish brown (10YR 4/6) silty clay loam, strong brown (7.5YR 5/6) dry; moderate medium subangular blocky structure; slightly hard, firm, sticky and plastic, weakly smeary; common fine, medium, and coarse roots; common fine pores; 5 percent soft angular siltstone pebbles; strongly acid.

The profile has hue of 10YR or 7.5YR throughout. The particle-size control section is 0 to 10 percent soft siltstone fragments.

The A horizon has value of 2 or 3 moist and 3 to 5 dry, and it has chroma of 2 or 3 moist and 2 to 4 dry.

The Bw horizon has value of 3 to 5 moist and 5 or 6 dry, and it has chroma of 4 to 6 moist or dry. It is silty clay loam or silty clay.

Baumgard Series

The Baumgard series consists of deep, well drained soil on benches, hillslopes, and ridgetops. These soils formed in volcanic ash and in residuum and colluvium derived dominantly from andesite and andesitic volcanic breccia. Slope is 5 to 65 percent. Elevation is 400 to 1,800 feet. The mean annual precipitation is 60 to 70 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 150 to 225 days.

These soils are classified as fine-loamy, mixed, mesic Andeptic Haplohumults.

Typical pedon of Baumgard silt loam, 5 to 30 percent slopes; about 17 miles east of Kelso; 500 feet south and 2,200 feet east of the northwest corner of sec. 22, T. 8 N., R. 2 E.

Oe—2 inches to 0; partially decomposed organic litter, including needles, leaves, twigs, bark chips, and mosses; abrupt smooth boundary.

A—0 to 11 inches; dark brown (7.5YR 3/2) silt loam, brown (7.5YR 5/4) dry; weak medium granular structure; soft, friable, slightly sticky and slightly plastic, weakly smeary; many fine, medium, and coarse roots; 10 percent shotlike aggregates; moderately acid; clear wavy boundary.

BA—11 to 18 inches; dark brown (7.5YR 3/4) gravelly clay loam, brown (7.5YR 5/4) dry; moderate medium granular and subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots and few coarse roots; many fine pores; 15 percent pebbles and 5 percent cobbles; strongly acid; clear wavy boundary.

2Bt1—18 to 33 inches; dark brown (7.5YR 3/4) gravelly clay loam, brown (7.5YR 5/4) dry; moderate medium and coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few medium roots; common fine and medium pores; few faint clay films on faces of peds; 15 percent pebbles; strongly acid; abrupt wavy boundary.

2Bt2—33 to 50 inches; yellowish red (5YR 4/6) gravelly silty clay loam, yellowish red (5YR 5/6) dry; weak fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; few fine pores; few faint clay films on faces of peds; 20 percent pebbles; strongly acid; clear irregular boundary.

R—50 inches; finely fractured andesite.

Depth to bedrock is 40 to 60 inches. The particle-size control section is 15 to 35 percent pebbles and cobbles. The profile is slightly acid to strongly acid throughout.

The A horizon has hue of 7.5YR, value of 2 or 3 moist and 4 or 5 dry, and chroma of 2 or 3 moist and 2 to 4 dry.

The BA horizon has hue of 5YR or 7.5YR, value of 3 or 4 moist and 4 or 5 dry, and chroma of 3 or 4 moist or dry. It is silt loam, clay loam, silty clay loam, gravelly silt loam, gravelly clay loam, or gravelly silty clay loam. It is 15 to 25 percent pebbles and cobbles.

The 2Bt horizon has hue of 5YR or 7.5YR, value of 3 or 4 moist and 4 or 5 dry, and chroma of 4 to 6 moist or dry. It is gravelly silt loam, gravelly silty clay loam, gravelly clay loam, very gravelly clay loam, or very gravelly silty clay loam. It is 15 to 40 percent pebbles and cobbles.

Beigle Series

The Beigle series consists of deep, well drained soils on mountainslopes and broad ridgetops. These soils formed in residuum and colluvium derived from andesite and andesitic volcanic breccia with a mantle of volcanic ash and loess. Slope is 5 to 65 percent. Elevation is 1,800 to 2,800 feet. The mean annual precipitation is 70 to 100 inches, the mean annual air temperature is about 43 degrees F, and the growing season is 140 to 190 days.

These soils are classified as medial, frigid Andic Haplumbrepts.

Typical pedon of Beigle silt loam, 5 to 30 percent slopes; about 15 miles northeast of Kelso; 40 feet south and 2,700 feet east of the northwest corner of sec. 5, T. 8 N., R. 2 E.

Oe—2 inches to 0; loose, partially decomposed organic litter, including needles, leaves, twigs, bark chips, cones, and roots; abrupt smooth boundary.

A—0 to 13 inches; very dark brown (10YR 2/2) silt loam, dark brown (10YR 3/3) dry; weak fine and medium subangular blocky structure parting to weak very fine granular; soft, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 20 percent shotlike aggregates 2 to 5 millimeters in diameter; 5 percent subangular pebbles; strongly acid; clear wavy boundary.

AB—13 to 17 inches; dark brown (10YR 3/3) silt loam, yellowish brown (10YR 5/4) dry; moderate fine and medium subangular blocky structure parting to moderate very fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 15 percent shotlike aggregates 2 to 5 millimeters in diameter; 5 percent subangular pebbles; moderately acid; clear wavy boundary.

Bw1—17 to 25 inches; dark yellowish brown (10YR 3/4) silt loam, yellowish brown (10YR 5/4) dry; moderate medium subangular blocky structure parting to moderate very fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common very fine, fine, medium, and coarse roots; many fine pores; 10 percent shotlike aggregates 2 to 5 millimeters in diameter; 10 percent subangular pebbles; moderately acid; clear wavy boundary.

Bw2—25 to 42 inches; brown (7.5YR 4/4) gravelly silt loam, strong brown (7.5YR 5/6) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common very fine, fine, medium, and coarse roots; many fine pores; 15 percent subangular pebbles and 5 percent cobbles; moderately acid; clear wavy boundary.

C—42 to 46 inches; brown (7.5YR 4/4) very gravelly loam, strong brown (7.5YR 5/6) dry; massive; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few roots; few pores; 40 percent angular and subangular weathered andesite pebbles and 10 percent cobbles; moderately acid; abrupt irregular boundary.

R—46 inches; highly fractured, weathered andesite.

Depth to bedrock is 40 to 60 inches. The particle-size control section is 15 to 30 percent rock fragments. The profile is slightly acid to strongly acid throughout.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 moist and 3 to 5 dry, and chroma of 2 or 3 moist or dry.

The AB horizon has hue of 10YR or 7.5YR, value of 2 or 3 moist and 4 or 5 dry, and chroma of 3 or 4 moist or dry. It is 5 to 30 percent pebbles.

The Bw horizon has hue of 10YR or 7.5YR, value of 3 or 4 moist and 5 to 7 dry, and chroma of 4 to 6 moist or dry. It is loam or silt loam. It is 10 to 20 percent pebbles and 5 to 15 percent cobbles.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5 moist and 5 to 7 dry, and chroma of 3 to 6 moist or dry. It is silt loam or loam. It is 15 to 40 percent pebbles and 5 to 15 percent cobbles.

Boistfort Series

The Boistfort series consists of very deep, well drained soils on convex hillslopes. These soils formed in residuum derived dominantly from basalt and breccia. Slope is 5 to 30 percent. Elevation is 800 to 1,800 feet. The mean annual precipitation is 70 to 90 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 200 to 240 days.

These soils are classified as medial over clayey, oxidic, mesic Typic Dystrandepts.

Typical pedon of Boistfort silt loam, 5 to 30 percent slopes; about 12 miles northwest of Castle Rock; 1,000 feet east and 1,250 feet north of the southwest corner of sec. 25, T. 10 N., R. 4 W.

Oe—3 inches to 0; partially decomposed organic litter, including needles, leaves, twigs, cones, bark, and wood chips; abrupt smooth boundary.

A—0 to 16 inches; dark brown (7.5YR 3/2) silt loam, brown (10YR 4/3) dry; strong very fine and medium granular structure; soft, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 20 percent firm shotlike aggregates 2 to 5 millimeters in diameter; moderately acid; clear wavy boundary.

2Bw1—16 to 20 inches; dark brown (7.5YR 4/3) silty clay loam, yellowish brown (10YR 5/6) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common fine, medium, and coarse roots; many fine pores; 10 percent firm shotlike aggregates 2 to 5 millimeters in diameter; moderately acid; gradual wavy boundary.

2Bw2—20 to 27 inches; reddish brown (5YR 4/4) silty clay loam, strong brown (7.5YR 5/6) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few fine, medium, and coarse roots; many fine pores; 2 percent basalt pebbles; moderately acid; clear wavy boundary.

2Bw3—27 to 60 inches; yellowish red (5YR 5/6) silty clay loam, reddish yellow (7.5YR 6/6) dry; strong medium subangular blocky structure; slightly hard, friable, sticky and plastic, weakly smeary; few fine, medium, and coarse roots; common fine pores; 5 percent basalt pebbles; moderately acid.

The particle-size control section is 0 to 25 percent rock fragments, but it averages less than 10 percent, most of which are pebbles. The profile is moderately acid or strongly acid throughout.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3 moist and 3 or 4 dry, and chroma of 2 or 3 moist or dry. It is 0 to 20 percent pebbles and 10 to 30 percent shotlike aggregates.

The 2Bw horizon has hue of 5YR or 7.5YR, value of 4 or 5 moist and 5 or 6 dry, and chroma of 3 to 6 moist and 5 or 6 dry. It is silty clay loam or silty clay. It is 0 to 20 percent pebbles, but it averages less than 10 percent.

Buckpeak Series

The Buckpeak series consists of very deep, well drained soils on hillslopes and ridgetops. These soils formed in residuum and colluvium derived dominantly from siltstone and fine-grained sandstone. Slope is 30 to 90 percent. Elevation is 200 to 1,800 feet. The mean annual precipitation is 40 to 70 inches, the mean annual air temperature is about 51 degrees F, and the growing season is 175 to 240 days.

These soils are classified as fine-loamy, mixed, mesic Xeric Palehumults.

Typical pedon of Buckpeak silt loam, 30 to 65 percent slopes; about 12 miles northwest of Castle Rock; 500 feet east and 300 feet north of the southwest corner of sec. 25, T. 10 N., R. 4 W.

Oe—2 inches to 0; partially decomposed organic litter, including needles, leaves, and bark chips; abrupt smooth boundary.

A—0 to 12 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; strong fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots and common coarse roots; 10 percent shotlike aggregates 2 to 5 millimeters in diameter; strongly acid; clear wavy boundary.

AB—12 to 21 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; strong fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common fine, medium, and coarse roots; common fine pores; 5 percent soft pebble-sized siltstone fragments; moderately acid; clear wavy boundary.

Bt—21 to 37 inches; dark yellowish brown (10YR 4/4) silt loam, light brown (7.5YR 6/4) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine, medium, and coarse roots; common very fine and fine pores; many discontinuous faint clay films on faces of peds; 25 percent soft pebble-sized siltstone fragments; strongly acid; clear wavy boundary.

BCt—37 to 46 inches; dark yellowish brown (10YR 4/4) silty clay loam, light brown (7.5YR 6/4) dry; weak medium subangular blocky structure; hard, firm, sticky and plastic; few fine, medium, and coarse roots; common very fine and fine pores; many prominent clay films on faces of peds; 50 percent

soft pebble-sized siltstone fragments; strongly acid; abrupt irregular boundary.

C—46 to 60 inches; brown (7.5YR 4/4) silty clay loam, light brown (7.5YR 6/4) dry; massive; hard, firm, sticky and plastic; few coarse roots; common very fine and fine pores; 75 percent soft pebble-sized siltstone fragments; strongly acid.

The particle-size control section averages 35 to 65 percent soft pebble-sized siltstone or sandstone fragments.

The A and AB horizons have hue of 10YR or 7.5YR, value of 2 or 3 moist and 4 or 5 dry, and chroma of 2 or 3 moist or dry.

The Bt horizon has hue of 7.5YR or 10YR, value of 3 or 4 moist and 4 to 6 dry, and chroma of 3 to 5 moist and 5 or 6 dry. It is silt loam, silty clay loam, or loam. It is 15 to 40 percent soft pebble-sized siltstone or sandstone fragments.

The BCt horizon is silty clay loam or loam. It is 40 to 75 percent soft pebble-sized siltstone or sandstone fragments. It is strongly acid or very strongly acid.

Bunker Series

The Bunker series consists of deep, well drained soils on benches, hillslopes, mountainslopes, and ridgetops. These soils formed in colluvium derived dominantly from basalt and breccia. Slope is 5 to 90 percent. Elevation is 800 to 1,800 feet. The mean annual precipitation is 70 to 110 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 180 to 240 days.

These soils are classified as medial over clayey, oxidic, mesic Typic Dystrandepts.

Typical pedon of Bunker silt loam, 30 to 65 percent slopes; about 5 miles west of Ryderwood; 1,700 feet west and 400 feet north of the southeast corner of sec. 2, T. 10 N., R. 4 W.

Oe—2 inches to 1 inch; partially decomposed organic litter, including needles, twigs, and moss.

Oa—1 inch to 0; decomposed organic material and roots; abrupt smooth boundary.

A—0 to 8 inches; dark brown (7.5YR 3/3) silt loam, brown (7.5YR 4/4) dry; moderate medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; moderately acid; clear wavy boundary.

BA—8 to 12 inches; brown (7.5YR 4/4) silt loam, reddish brown (5YR 4/4) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic, weakly smeary; many very fine, fine, medium, and coarse roots; 10 percent angular basalt pebbles; few shotlike aggregates 2 to 5 millimeters in diameter; moderately acid; clear wavy boundary.

2Bw1—12 to 27 inches; brown (7.5YR 4/4) gravelly clay loam, dark yellowish brown (10YR 4/4) dry; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic, weakly smeary; common very fine, fine, medium, and coarse roots; many fine pores; 20 percent angular basalt pebbles; moderately acid; clear wavy boundary.

2Bw2—27 to 42 inches; brown (10YR 4/3) loam, yellowish brown (10YR 5/6) dry; weak fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 10 percent angular pebbles; moderately acid; clear wavy boundary.

R—42 inches; fractured basalt.

Depth to bedrock is 40 to 60 inches. The particle-size control section averages 15 to 35 percent rock fragments. The profile is moderately acid or strongly acid throughout.

The A horizon has hue of 5YR or 7.5YR, value of 2 or 3 moist and 4 or 5 dry, and chroma of 1 to 3 moist and 3 or 4 dry. It is 0 to 10 percent pebbles.

The 2Bw horizon has hue of 5YR to 10YR, value of 3 or 4 moist and 4 or 5 dry, and chroma of 3 or 4 moist and 4 to 6 dry. It is loam, silt loam, clay loam, or silty clay loam. It is 10 to 35 percent rock fragments, mostly pebbles.

Camas Series

The Camas series consists of very deep, excessively drained soils on flood plains. These soils formed in mixed alluvium. Slope is 0 to 3 percent. Elevation is 50 to 500 feet. The mean annual precipitation is 45 to 70 inches, the mean annual air temperature is about 51 degrees F, and the growing season is 200 to 240 days.

These soils are classified as sandy-skeletal, mixed, mesic Fluventic Haploxerolls.

Typical pedon of Camas cobbly loam, 0 to 3 percent slopes; about 13 miles northwest of Longview; 2,000 feet west and 200 feet north of the southeast corner of sec. 23, T. 9 N., R. 4 W.

A—0 to 4 inches; very dark brown (10YR 2/2) cobbly loam, very dark grayish brown (10YR 3/2) dry;

moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; 30 percent cobbles and 20 percent pebbles; many fine roots; moderately acid; clear smooth boundary.

AC—4 to 22 inches; very dark brown (10YR 2/2) very cobbly loam, brown (10YR 4/3) dry; moderate very fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; 40 percent cobbles and 20 percent pebbles; many fine roots to a depth of 10 inches and common fine roots to a depth of 18 inches; moderately acid; clear smooth boundary.

C—22 to 60 inches; dark brown (10YR 3/3) very cobbly loamy sand, brown (10YR 4/3) dry; single grain; loose, nonsticky and nonplastic; 45 percent cobbles and 25 percent pebbles; few very fine and fine roots; moderately acid.

Depth to very cobbly loamy sand is 10 to 30 inches. The profile is 30 to 50 percent pebbles and cobbles to a depth of 18 inches and 35 to 60 percent below this depth.

The A horizon has hue of 10YR, value of 2 or 3 moist and 2 to 4 dry, and chroma of 2 or 3 moist or dry. It is moderately acid to neutral.

The C horizon has hue of 10YR, value of 3 or 4 moist and 4 to 6 dry, and chroma of 3 or 4 moist or dry. Rock fragments in the C horizon range from pebbles to cobbles. The horizon is moderately acid.

These soils are subject to occasional, brief periods of flooding in November through May.

Caples Series

The Caples series consists of very deep, artificially drained soils on flood plains. These soils formed in mixed alluvium. Slope is 0 to 3 percent. Elevation is 15 to 40 feet. The mean annual precipitation is 40 to 50 inches, the mean annual air temperature is about 51 degrees F, and the growing season is 220 to 240 days.

These soils are classified as fine, mixed, nonacid, mesic Mollic Fluvaquents.

Typical pedon of Caples silty clay loam, 0 to 3 percent slopes; about 5 miles west of Longview; 1,500 feet west and 1,060 feet north of the southeast corner of sec. 16, T. 8 N., R. 3 W.

Ap1—0 to 4 inches; dark brown (10YR 3/3) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine granular and subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine and medium roots and few coarse roots; many wormcasts; moderately acid; abrupt smooth boundary.

Ap2—4 to 9 inches; dark brown (10YR 3/3) silty clay loam, grayish brown (10YR 5/2) dry; many moderate distinct strong brown (7.5YR 5/8) and gray (10YR 6/1) mottles, strong brown (7.5YR 5/8) and light brownish gray (10YR 6/2) dry; strong fine subangular blocky structure and moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots and few coarse roots; few medium and coarse tubular pores; moderately acid; abrupt smooth boundary.

Bg1—9 to 25 inches; gray (5Y 5/1) silty clay loam, gray (5Y 6/1) dry; many fine prominent yellowish red (5YR 5/6) and dusky red (2.5YR 3/4) mottles, strong brown (7.5YR 5/6) and dusky red (2.5YR 3/4) dry; moderate fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; many fine and medium roots; common medium tubular pores; moderately acid; clear smooth boundary.

Bg2—25 to 39 inches; grayish brown (2.5Y 5/2) silty clay loam, light brownish gray (2.5Y 6/2) dry; many medium prominent dark reddish brown (5YR 3/2), reddish brown (5YR 4/4), and strong brown (7.5YR 5/6) mottles, dark reddish brown (5YR 2.5/2), yellowish red (5YR 5/6), and reddish yellow (5YR 6/6) dry; moderate coarse prismatic structure and weak thick platy; very hard, firm, sticky and plastic; common fine and medium roots; few fine, medium, and coarse tubular pores; moderately acid; abrupt smooth boundary.

Cg1—39 to 44 inches; dark gray (5Y 4/1) silty clay loam, gray (5Y 6/1) dry; few fine prominent brown (7.5YR 4/4) mottles along old root channels, reddish yellow (7.5YR 6/8) dry; massive; very hard, firm, sticky and plastic; few roots; common coarse tubular pores; moderately acid; clear smooth boundary.

Cg2—44 to 60 inches; gray (N 5/0) silty clay loam, gray (5Y 6/1) dry; few fine prominent brown (7.5YR 4/4) mottles along old root channels, strong brown (7.5YR 5/8) dry; massive; very hard, firm, very sticky and plastic; few fine roots; common coarse tubular pores; moderately acid.

The particle-size control section averages 35 to 45 percent clay and 0 to 5 percent rock fragments. The solum is 30 to 40 inches thick. The profile is slightly acid to strongly acid throughout.

The A horizon has hue of 10YR, value of 2 or 3 moist and 4 or 5 dry, and chroma of 1 to 3 moist or dry. It is mottled in some pedons.

The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5 moist, and chroma of 1 or 2. It has prominent mottles. It is silty clay or silty clay loam.

The Cg horizon has hue of 2.5Y or 5Y, or it is neutral in hue. It has value of 4 to 6 moist and 5 to 7 dry and chroma of 0 to 2 moist or dry. It has prominent mottles. It is dominantly silty clay or silty clay loam. In some pedons the Cg horizon has lenses of sandy loam, loamy sand, or sand 0.5 inch to 3.0 inches thick and is sandy loam or loamy sand below a depth of 40 inches.

Depth to the apparent high water table is 1.5 to 2.5 feet in November through April.

Carrolls Series

The Carrolls series consists of very deep, somewhat poorly drained soils in swales and on flood plains and low terraces. These soils formed in sandy tailwater deposits and sandy dredge material over mudflow. Slope is 0 to 2 percent. Elevation is 10 to 100 feet. The mean annual precipitation is 45 to 60 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 200 to 240 days.

These soils are classified as mixed, mesic Typic Psammaquents.

Typical pedon of Carrolls loamy sand, 0 to 2 percent slopes; about 3 miles south of Castle Rock; 2,280 feet west and 2,380 feet south of the northeast corner of sec. 26, T. 9 N., R. 2 W.

C1—0 to 7 inches; dark gray (10YR 4/1) loamy sand, gray (10YR 6/1) dry; single grain; loose; many very fine and fine roots; neutral; abrupt smooth boundary.

C2—7 to 10 inches; gray (10YR 5/1) very fine sandy loam, gray (10YR 6/1) dry; common fine distinct yellowish brown (10YR 5/6) mottles, brownish yellow (10YR 6/6) dry; massive; soft, very friable, nonsticky and nonplastic; neutral; abrupt smooth boundary.

C3—10 to 60 inches; dark grayish brown (10YR 4/2) loamy sand, grayish brown (10YR 5/2) dry; single grain; loose, nonsticky and nonplastic; neutral.

The particle-size control section averages 0 to 5 percent rock fragments and 5 to 20 percent volcanic glass. The profile is slightly acid or neutral throughout.

The C horizon has hue of 10YR to 2.5Y, value of 4 or 5 moist and 5 or 6 dry, and chroma of 1 or 2 moist or dry. It is loamy sand, sand, fine sandy loam, or very fine sandy loam. It is 0 to 10 percent rock fragments between depths of 10 and 40 inches.

A high water table is 1 foot above the surface to a depth of 1.5 feet below the surface in November through April. Unprotected areas of these soils are subject to frequent, brief periods of flooding in October through May.

Centralia Series

The Centralia series consists of very deep, well drained soils on ridgetops, plateaus, and hillslopes. These soils formed in residuum and colluvium derived dominantly from sandstone. Slope is 0 to 30 percent. Elevation is 200 to 1,600 feet. The mean annual precipitation is 40 to 70 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 175 to 240 days.

These soils are classified as fine-loamy, mixed, mesic Xeric Palehumults.

Typical pedon of Centralia silt loam, 8 to 20 percent slopes; about 1.5 miles west of Ryderwood; 100 feet south and 300 feet east of the northwest corner of sec. 8, T. 10 N., R. 3 W.

Oi—1.5 inches to 0.5 inch; partially decomposed organic litter, including leaves, needles, twigs, bark, roots, and moss; abrupt smooth boundary.

Oe—0.5 inch to 0; decomposed organic material; abrupt smooth boundary.

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; many very fine interstitial pores; few medium rounded ironstone nodules; strongly acid; clear smooth boundary.

A2—3 to 6 inches; very dark brown (10YR 2/2) silt loam, brown (10YR 5/3) dry; moderate medium granular structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; many fine and medium tubular pores; many medium and coarse rounded ironstone nodules; strongly acid; clear smooth boundary.

BA—6 to 10 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak medium subangular blocky structure parting to moderate medium granular; soft, very friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; many fine and medium tubular pores; many medium and common coarse rounded ironstone nodules; moderately acid; clear smooth boundary.

Bt1—10 to 18 inches; dark brown (10YR 4/3) clay loam, yellowish brown (10YR 5/4) dry; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common faint dark yellowish brown (10YR 4/4) clay bridges between sand grains; common fine to coarse roots; many very fine and fine interstitial and tubular pores; moderately acid; gradual smooth boundary.

Bt2—18 to 30 inches; dark brown (10YR 4/3) clay loam, yellowish brown (10YR 5/4) dry; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common faint dark yellowish brown (10YR 4/4) clay bridges between sand grains; common fine to coarse roots; many very fine and fine interstitial and tubular pores; 2 percent soft pebbles; strongly acid; clear wavy boundary.

Bt3—30 to 41 inches; brown (7.5YR 4/4) clay loam, yellowish brown (10YR 5/6) dry; weak medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common patchy faint brown (7.5YR 5/4) clay films on faces of peds; few fine to coarse roots; many very fine and fine interstitial and tubular pores; 2 percent soft pebbles; strongly acid; gradual wavy boundary.

BCt—41 to 60 inches; yellowish brown (10YR 5/8) loam, yellow (10YR 7/8) dry; weak medium subangular blocky structure parting to weak fine subangular blocky; soft, friable, slightly sticky and slightly plastic; common faint yellowish brown (10YR 5/8) clay bridges between sand grains; few fine and medium roots; many very fine and fine interstitial and tubular pores; 15 percent soft pebbles; strongly acid.

The particle-size control section is 27 to 35 percent clay and more than 15 percent material that is coarser than very fine sand. The profile has hue of 10YR or 7.5YR throughout.

The A horizon has value of 2 or 3 moist and 4 or 5 dry, and it has chroma of 2 or 3 moist or dry. It is 5 to 10 percent ironstone nodules. It is slightly acid to strongly acid.

The upper part of the Bt horizon has value of 4 or 5 moist and 5 or 6 dry, and it has chroma of 3 or 4 moist and 4 to 6 dry. It is moderately acid or strongly acid. The lower part of the Bt horizon has value of 4 or 5 moist and 5 or 6 dry, and it has chroma of 2 to 4 moist or dry. It is silty clay loam or clay loam. It is moderately acid or strongly acid.

The BC horizon has value of 4 or 5 moist and 5 to 7 dry, and it has chroma of 2 to 8 moist or dry. It is clay loam, silty clay loam, or loam.

Cinebar Series

The Cinebar series consists of very deep, well drained soils on hillslopes, benches, and terraces. These soils formed in aerially deposited volcanic ash over glaciofluvial deposits of volcanic ash. Slope is 0 to 65 percent. Elevation is 300 to 1,800 feet. The mean annual precipitation is 60 to 75 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 150 to 200 days.

These soils are classified as medial, mesic Typic Dystrandepts.

Typical pedon of Cinebar silt loam, 5 to 20 percent slopes; about 11 miles southeast of Toutle; 2,000 feet east and 900 feet south of the northwest corner of sec. 36, T. 10 N., R. 2 E.

Oe—3 inches to 0; partially decomposed organic litter, including needles, leaves, twigs, and bark chips; abrupt smooth boundary.

A1—0 to 4 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few fine, medium, and coarse roots; many fine pores; 30 percent very soft shotlike aggregates 2 to 5 millimeters in diameter; slightly acid; abrupt wavy boundary.

A2—4 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; weak very fine, fine, and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few medium and coarse roots and many fine roots; common fine pores; 30 percent very soft shotlike aggregates 2 to 5 millimeters in diameter; slightly acid; clear smooth boundary.

Bw1—10 to 16 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak very fine, fine, and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic, weakly smeary; few medium and coarse roots and common fine roots; common fine pores; 15 percent very soft shotlike aggregates 2 to 5 millimeters in diameter; slightly acid; clear wavy boundary.

Bw2—16 to 23 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; weak very fine, fine, and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few medium roots and common very fine and fine roots; common fine and medium tubular and vesicular pores; slightly acid; gradual wavy boundary.

C—23 to 60 inches; yellowish brown (10YR 5/6) silt loam, light yellowish brown (10YR 6/4) dry; massive; hard, extremely firm, slightly sticky and slightly plastic, weakly smeary; few fine roots; many fine and medium tubular pores and few medium vesicular pores; slightly acid.

Depth to glacial drift is 40 to 60 inches or more. The

profile has hue of 10YR throughout. The particle-size control section is 0 to 10 percent rock fragments, most of which are pebbles.

The A horizon has value of 2 to 4 moist and 3 to 5 dry, and it has chroma of 1 to 3 moist or dry. It is very strongly acid to neutral. It is silt loam or loamy sand.

The Bw horizon has value of 3 or 4 moist and 5 or 6 dry, and it has chroma of 3 or 4 moist or dry. It is strongly acid to neutral.

The C horizon has value of 4 or 5 moist and 5 or 6 dry. It is silt loam or loam. It is strongly acid to neutral.

Cinnamon Series

The Cinnamon series consists of very deep, well drained soils on mountainslopes, mountain benches, and ridgetops. These soils formed in pyroclastic flows of volcanic ash and pumice over older, weathered tephra. Slope is 5 to 90 percent. Elevation is 1,800 to 2,800 feet. The mean annual precipitation is 100 to 135 inches, the mean annual air temperature is about 43 degrees F, and the growing season is 125 to 175 days.

These soils are classified as ashy over medial, frigid Typic Vitrandepts.

Typical pedon of Cinnamon sandy loam, 5 to 30 percent slopes; about 5 miles northwest of Cougar; 1,800 feet east and 2,300 feet north of the southwest corner of sec. 1, T. 7 N., R. 3 E.

Oe—2 inches to 0; partially decomposed organic litter, including needles, leaves, twigs, and bark chips; abrupt smooth boundary.

A—0 to 3 inches; very dark brown (10YR 2/2) sandy loam (volcanic ash), dark grayish brown (10YR 4/2) dry; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots and common coarse roots; many fine irregular pores; moderately acid; clear wavy boundary.

Bw1—3 to 8 inches; dark brown (10YR 3/3) sandy loam (volcanic ash), pale brown (10YR 6/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots, common medium roots, and few coarse roots; many fine irregular pores and common fine tubular pores; slightly acid; clear wavy boundary.

Bw2—8 to 22 inches; brown (10YR 4/3) sandy loam (volcanic ash), pale brown (10YR 6/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and few medium and coarse roots; many fine irregular pores and common fine tubular pores; moderately acid; abrupt wavy boundary.

Bwb1—22 to 38 inches; dark yellowish brown (10YR 4/4) sandy loam, light yellowish brown (10YR 6/4) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; weakly smeary ; common very fine and fine roots and few medium roots; many fine irregular pores and few fine tubular pores; 20 percent weathered pumice fragments and 5 percent pebbles; slightly acid; abrupt wavy boundary.

2Bwb2—38 to 60 inches; yellowish brown (10YR 5/4) sandy loam, very pale brown (10YR 7/4) dry; moderate medium and coarse subangular blocky structure; hard, firm, nonsticky and nonplastic, weakly smeary; few very fine and fine roots; many fine irregular pores and few fine tubular pores; 20 percent weathered pumice fragments and 10 percent pebbles; slightly acid.

The mantle of ash is 20 to 30 inches thick, and it is more than 60 percent volcanic ash and cinders.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3 moist and 4 to 6 dry, and chroma of 2 or 3 moist or dry. It is moderately acid to neutral.

The Bw horizon has value of 3 or 4 moist and 5 or 6 dry, and it has chroma of 3 or 4 moist or dry. It is loamy sand or sandy loam. It is moderately acid to neutral.

The 2Bwb horizon has value of 4 or 5 moist and 5 to 7 dry, and it has chroma of 4 to 6 moist or dry. It is sandy loam or loam. It is 5 to 15 percent andesite pebbles and 20 to 50 percent weathered pumice. The horizon is moderately acid or slightly acid. Below a depth of 40 inches in some pedons, the 2Bwb horizon is compacted or weakly cemented and is very hard or hard when dry.

Clato Series

The Clato series consists of very deep, well drained soils on flood plains. These soils formed in mixed alluvium derived from sedimentary and basic igneous rock. Slope is 0 to 3 percent. Elevation is 30 to 300 feet. The mean annual precipitation is 40 to 60 inches, the mean annual air temperature is about 51 degrees F, and the growing season is 215 to 240 days.

These soils are classified as coarse-silty, mixed, mesic Fluventic Xerochrepts.

Typical pedon of Clato silt loam, 0 to 3 percent slopes; about 3 miles west of Castle Rock and 180 feet northeast of the intersection of Hazel Dell and Delameter Roads; 940 feet west and 990 feet south of the northeast corner of sec. 17, T. 9 N., R. 2 W.

Ap—0 to 11 inches; dark yellowish brown (10YR 3/4) silt loam, yellowish brown (10YR 5/4) dry; strong

medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine and medium roots; many fine tubular pores; moderately acid; clear smooth boundary.

AB—11 to 19 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; strong fine subangular blocky structure; hard, very friable, nonsticky and slightly plastic; many fine and medium roots in the upper 3 inches and common fine roots in the lower 5 inches; many fine interstitial pores; moderately acid; clear smooth boundary.

Bw1—19 to 42 inches; dark yellowish brown (10YR 3/4) silt loam, yellowish brown (10YR 5/4) dry; moderate medium prismatic structure parting to moderate fine subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine roots; many fine and few coarse tubular pores; moderately acid; diffuse smooth boundary.

Bw2—42 to 69 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; many fine and few coarse tubular pores; moderately acid; gradual smooth boundary.

C—69 to 80 inches; dark yellowish brown (10YR 3/4) silt loam, yellowish brown (10YR 5/4) dry; common medium distinct dark grayish brown (10YR 4/2) and dark reddish brown (5YR 3/4) mottles, grayish brown (10YR 5/2) and reddish brown (5YR 4/4) dry; massive; hard, friable, slightly sticky and slightly plastic; few fine roots in the upper 3 inches; many fine and few coarse tubular pores; moderately acid.

The particle-size control section is 10 to 18 percent clay and 0 to 15 percent material that is coarser than very fine sand. Sandy strata are below a depth of 40 inches in some pedons. The profile is slightly acid to strongly acid throughout.

The Ap horizon has value of 2 to 4 moist and 5 or 6 dry, and it has chroma of 4 to 6 moist or dry.

The AB horizon has value of 3 or 4 moist and 5 or 6 dry, and it has chroma of 3 to 6 moist or dry.

The Bw horizon has value of 3 or 4 moist and 5 or 6 dry, and it has chroma of 3 to 6 moist or dry.

Coweeman Series

The Coweeman series consists of very deep, somewhat poorly drained soils on stream terraces and ridges. These soils formed in old mixed alluvium. Slope is 3 to 30 percent. Elevation is 250 to 700 feet. The mean annual precipitation is 45 to 65 inches, the mean annual air temperature is about 51 degrees F, and the growing season is 220 to 240 days.

These soils are classified as fine, mixed, mesic Aquic Palexeralfs.

Typical pedon of Coweeman silty clay loam, 3 to 30 percent slopes; about 6 miles southeast of Kelso; 1,625 feet east and 565 feet north of the southwest corner of sec. 17, T. 7 N., R. 1 W.

Oe—3 inches to 0; partially decomposed organic litter, including needles, leaves, twigs, and bark chips; abrupt smooth boundary.

A—0 to 7 inches; dark grayish brown (10YR 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; strong medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine and medium roots and few coarse roots; strongly acid; abrupt wavy boundary.

BAt—7 to 14 inches; light brownish gray (10YR 6/2) silty clay loam, very pale brown (10YR 8/2) dry; few fine faint mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; many fine and medium roots; common fine and few medium tubular pores; common distinct clay films on peds and lining pores; few medium shotlike aggregates; strongly acid; clear wavy boundary.

Btg1—14 to 22 inches; light brownish gray (2.5Y 6/2) clay, pale yellow (2.5Y 8/2) dry; few medium distinct strong brown (7.5YR 5/8) mottles; strong medium and fine prismatic structure parting to strong fine and very fine angular blocky; very hard, very firm, sticky and very plastic; few fine roots; common fine and few medium tubular pores; common distinct clay films on peds and lining pores; few fine shotlike aggregates; common medium black concretions and stains; strongly acid; abrupt wavy boundary.

Btg2—22 to 30 inches; light olive gray (5Y 6/2) clay, pale yellow (5Y 8/2) dry; many medium prominent strong brown (7.5YR 5/8) mottles; strong medium and fine prismatic structure parting to strong fine angular blocky; very hard, very firm, sticky and very plastic; few fine roots; common fine tubular pores; many prominent clay films on peds and lining pores; common medium black concretions and stains; moderately acid; abrupt wavy boundary.

Btg3—30 to 35 inches; gray (5Y 6/1) clay, light gray (5Y 7/1) dry; few medium prominent strong brown (7.5YR 5/6) mottles; strong coarse and medium prismatic structure parting to strong very fine angular blocky; very hard, very firm, sticky and very plastic; common fine tubular pores; many prominent clay films on peds and lining pores; moderately acid; abrupt wavy boundary.

Btg4—35 to 63 inches; gray (5Y 6/1) clay, light gray

(5Y 7/1) dry; few fine distinct strong brown (7.5YR 5/8) and reddish brown (5YR 5/3) mottles; strong fine angular blocky structure; very hard, very firm, sticky and very plastic; few very fine tubular pores; many prominent clay films on peds and lining pores; moderately acid; abrupt wavy boundary.

Btg5—63 to 70 inches; greenish gray (5GY 6/1) clay, light greenish gray (5GY 7/1) dry; few fine prominent yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure parting to strong fine angular blocky; extremely hard, very firm, sticky and very plastic; very few fine tubular pores; many thick clay films on faces of peds and lining pores; moderately acid (pH 6.0).

The solum is more than 48 inches thick. The profile is 0 to 15 percent rock fragments throughout.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5 moist, and chroma of 2 or 3 moist or dry. It is strongly acid or very strongly acid. It is silt loam or silty clay loam.

The BAt horizon has hue of 10YR or 2.5Y, value of 4 to 6 moist and 7 or 8 dry, and chroma of 2 or 3 moist or dry. It is silty clay loam or silty clay. It is strongly acid or moderately acid.

The Btg horizon has hue of 5GY to 2.5Y, value of 5 or 6 moist, and chroma of 1 or 2 moist or dry. It is strongly acid or moderately acid.

Depth to the perched high water table is 1 foot to 2 feet in December through March.

Cowlitz Series

The Cowlitz series consists of very deep, somewhat excessively drained soils on flood plains and river terraces. These soils formed in gravelly debris flow and gravelly dredge material over mudflow. Slope is 0 to 30 percent. Elevation is 10 to 200 feet. The mean annual precipitation is 45 to 80 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 175 to 240 days.

These soils are classified as sandy-skeletal, mixed, mesic Typic Xerorthents.

Typical pedon of Cowlitz extremely gravelly sand, disturbed, 0 to 5 percent slopes; about 3 miles south of Castle Rock; 2,300 feet west and 2,175 feet north of the southeast corner of sec. 26, T. 9 N., R. 2 W.

C1—0 to 11 inches; dark gray (10YR 4/1) extremely gravelly sand, gray (10YR 6/1) dry; single grain; loose, nonsticky and nonplastic; 65 percent pebbles and 5 percent cobbles; common very fine and fine roots; neutral; abrupt smooth boundary.

C2—11 to 24 inches; dark gray (10YR 4/1) very gravelly sand, gray (10YR 6/1) dry; single grain; loose, nonsticky and nonplastic; 45 percent pebbles and 5 percent cobbles; neutral; abrupt smooth boundary.

C3—24 to 60 inches; dark gray (10YR 4/1) very gravelly sand, light brownish gray (10YR 6/2) dry; single grain; loose, nonsticky and nonplastic; 45 percent pebbles and 5 percent cobbles; neutral.

The particle-size control section averages 35 to 80 percent rock fragments. The profile is slightly acid or neutral. Woody organic debris is in some pedons.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6 moist and 6 or 7 dry, and chroma of 0 to 2 moist or dry. It is extremely gravelly sand, extremely gravelly loamy sand, very gravelly sand, or very gravelly loamy sand.

Unprotected, low-lying areas of these soils are subject to occasional, brief periods of flooding in November through April.

Delameter Series

The Delameter series consists of very deep, somewhat excessively drained soils on highly irregular, dissected valley floors. These soils formed in avalanche debris flow material. Slope is 0 to 20 percent. Elevation is 1,200 to 2,700 feet. The mean annual precipitation is 90 to 110 inches, the mean annual air temperature is about 44 degrees F, and the growing season is 125 to 175 days.

These soils are classified as sandy-skeletal, mixed, frigid Typic Udorthents.

Typical pedon of Delameter extremely gravelly loamy sand, 0 to 20 percent slopes; about 14 miles east of Toutle; 560 feet west and 1,750 feet south of the northeast corner of sec. 33, T. 10 N., R. 3 E.

C1—0 to 10 inches; dark gray (10YR 4/1) extremely gravelly loamy sand, gray (10YR 6/1) dry; single grain; loose, nonsticky and nonplastic; many medium and coarse pores; 15 percent cobbles, 40 percent pebbles, and 15 percent pumice fragments; moderately acid; clear wavy boundary.

C2—10 to 60 inches; dark gray (10YR 4/1) extremely gravelly loamy sand, gray (10YR 5/1) dry; single grain; loose, nonsticky and nonplastic; many medium and coarse irregular pores; 15 percent cobbles, 45 percent pebbles, and 15 percent pumice fragments; moderately acid.

The particle-size control section averages 15 to 30 percent volcanic glass and glass aggregates, and it is 35 to 70 percent rock fragments. The upper 7 to 14 inches of the profile is 30 to 60 percent volcanic glass. The profile is moderately acid or slightly acid. Woody

organic debris that consists of logs, branches, and bark is in some pedons.

The C1 horizon has hue of 5YR to 2.5Y, value of 3 to 6 moist and 4 to 8 dry, and chroma of 1 to 4 moist or dry.

The C2 horizon has hue of 7.5YR to 2.5Y, value of 3 to 5 moist and 4 to 8 dry, and chroma of 1 to 3 moist or dry. It is very gravelly loamy sand, extremely gravelly loamy sand, or extremely cobbly sand.

Dobbs Series

The Dobbs series consists of moderately deep, moderately well drained soils in cirque basins and alpine glacial valleys and on adjacent mountainslopes. These soils formed in glacial till derived from andesite. They have a mantle of volcanic ash and pumiceous cinders and are underlain by very compact, dense basal till. Slope is 5 to 65 percent. Elevation is 2,000 to 3,200 feet. The mean annual precipitation is 70 to 90 inches, the mean annual air temperature is about 43 degrees F, and the growing season is 160 to 180 days.

These soils are classified as medial-skeletal, frigid Andic Haplumbrepts.

Typical pedon of Dobbs gravelly silt loam, 5 to 30 percent slopes; about 6 miles northwest of Cougar; 400 feet south and 660 feet west of the northeast corner of sec. 26, T. 7 N., R. 3 E.

Oe—4 to 2 inches; partially decomposed organic litter, including needles, leaves, twigs, and bark chips; abrupt smooth boundary.

Oi—2 inches to 0; decomposed organic material; abrupt smooth boundary.

A—0 to 4 inches; very dark brown (7.5YR 2/2) gravelly silt loam, brown (7.5YR 4/2) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 15 percent rounded and subangular pebbles; moderately acid; abrupt wavy boundary.

AB—4 to 14 inches; dark brown (10YR 3/3) gravelly silt loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; many very fine and medium roots and common coarse roots; many fine pores; 30 percent rounded and subangular pebbles and few cobbles; slightly acid; clear wavy boundary.

Bw1—14 to 26 inches; brown (7.5YR 4/4) very gravelly sandy loam, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; many very fine roots and common fine and medium roots; common very fine and fine pores; 40 percent rounded and subangular pebbles and 15 percent cobbles; slightly acid; gradual wavy boundary.

Bw2—26 to 35 inches; brown (7.5YR 4/4) very gravelly sandy loam, light yellowish brown (10YR 6/4) dry; moderate coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; many very fine and few fine roots; common very fine and fine pores; 35 percent rounded and subangular pebbles and 10 percent cobbles; slightly acid; clear wavy boundary.

2Cd—35 to 60 inches; brown (10YR 4/3) dense glacial till that breaks to extremely gravelly loamy sand, pale brown (10YR 6/3) dry; massive; very hard, very firm; 60 percent rounded and subangular pebbles and cobbles and few stones; slightly acid.

Depth to dense glacial till is 30 to 40 inches. The profile is slightly acid or moderately acid throughout.

The A horizon has hue of 7.5YR or 5YR, value of 2 or 3 moist and 4 or 5 dry, and chroma of 2 or 3 moist and 2 to 4 dry. It is 10 to 20 percent pebbles.

The Bw horizon has hue of 10YR or 7.5YR, value of 3 or 4 moist and 4 to 6 dry, and chroma of 4 to 6 moist or dry. It is silt loam, loam, or sandy loam. It is 35 to 40 percent pebbles and 5 to 15 percent cobbles.

The 2Cd horizon is dense glacial till. It is sandy loam or loamy sand when crushed. It is 40 to 60 percent pebbles and 20 to 30 percent cobbles.

Depth to the perched high water table is 2.5 to 3.0 feet in November through March.

Domell Series

The Domell series consists of very deep, well drained soils on benches, mountainslopes, and broad ridgetops. These soils formed in lahar and mudflow material with a high content of volcanic ash and pumiceous cinders. Slope is 5 to 70 percent. Elevation is 1,800 to 2,600 feet. The mean annual precipitation is 70 to 80 inches, the mean annual air temperature is about 43 degrees F, and the growing season is 160 to 180 days.

These soils are classified as medial, frigid Typic Dystrandepts.

Typical pedon of Domell sandy loam, 5 to 30 percent slopes; about 15 miles east of Toutle; 1,800 feet south and 1,500 feet east of the northwest corner of sec. 27, T. 10 N., R. 3 E.

Oe—2 inches to 0; partially decomposed organic litter, including needles, leaves, twigs, bark chips, and cones; abrupt smooth boundary.

A—0 to 8 inches; very dark brown (10YR 2/2) sandy

loam, grayish brown (10YR 5/2) dry; strong fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many very fine pores; 10 percent rounded and subangular weathered pumice fragments 3 to 8 centimeters in diameter; moderately acid; clear wavy boundary.

AB—8 to 14 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 5/3) dry; strong fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many very fine pores; 5 percent rounded and subangular weathered pumice fragments 3 to 8 centimeters in diameter; moderately acid; clear wavy boundary.

Bw1—14 to 23 inches; dark yellowish brown (10YR 4/4) sandy loam, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure parting to very fine and fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, common fine, and few medium roots; common fine pores; 10 percent rounded and subangular weathered pumice fragments 2 to 6 centimeters in diameter; moderately acid; gradual wavy boundary.

Bw2—23 to 34 inches; dark yellowish brown (10YR 4/4) sandy loam, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure parting to very fine and fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, common fine, and few medium roots; common fine pores; 10 percent rounded and subangular weathered pumice fragments 2 to 6 centimeters in diameter; moderately acid; gradual wavy boundary.

BC1—34 to 45 inches; dark yellowish brown (10YR 4/4) and pale brown (10YR 6/3) loam, very pale brown (10YR 7/4) and light gray (10YR 7/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few very fine and fine roots; few fine pores; 5 percent subangular pebbles 2 to 6 centimeters in diameter; 15 percent weathered pumice fragments; moderately acid; clear wavy boundary.

BC2—45 to 60 inches; yellowish brown (10YR 5/6) and grayish brown (2.5Y 5/2) sandy loam, very pale brown (10YR 7/4) and light gray (10YR 7/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few very fine and fine roots; few fine pores; 5 percent subangular pebbles 2 to 10 millimeters in diameter; 5 percent weathered pumice fragments; moderately acid.

In some pedons these soils are underlain by alpine ablation and basal till at a depth of 50 to 60 inches. The profile is 5 to 30 percent pebble-sized, highly weathered pumice fragments throughout. It is slightly acid or moderately acid throughout.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3 moist and 4 or 5 dry, and chroma of 2 or 3 moist or dry. It is sandy loam, loamy sand, or stony sandy loam. It is 0 to 10 percent pebbles.

The Bw horizon has value of 3 or 4 moist and 4 to 6 dry. It is loam, fine sandy loam, or sandy loam. It is 5 to 20 percent pebbles and 0 to 10 percent cobbles.

The BC horizon has value of 4 or 5 moist and 5 to 7 dry, and it has chroma of 4 to 6 moist or dry. It is loam or sandy loam. It is 5 to 20 percent pebbles and 0 to 10 percent cobbles.

Edgewick Series

The Edgewick series consists of very deep, well drained soils on flood plains. These soils formed in mixed alluvium. Slope is 0 to 3 percent. Elevation is 50 to 300 feet. The mean annual precipitation is 50 to 60 inches, the mean annual air temperature is about 51 degrees F, and the growing season is 150 to 225 days.

These soils are classified as coarse-loamy, mixed, mesic Fluventic Haplumbrepts.

Typical pedon of Edgewick silt loam, 0 to 3 percent slopes; about 13 miles northwest of Longview; 1,700 feet west and 2,500 feet south of the northeast corner of sec. 26, T. 9 N., R. 4 W.

A1—0 to 4 inches; dark brown (7.5YR 3/3) silt loam, brown (7.5YR 5/4) dry; strong fine subangular blocky structure; soft, friable, nonsticky and slightly plastic; many fine, medium, and coarse roots; strongly acid; abrupt wavy boundary.

A2—4 to 11 inches; dark brown (7.5YR 3/3) loam, brown (7.5YR 5/4) dry; moderate fine and medium subangular blocky structure; hard, friable, nonsticky and slightly plastic; many fine, medium, and coarse roots; few fine tubular pores and many fine interstitial pores; few pebbles; strongly acid; clear smooth boundary.

Bw—11 to 25 inches; dark brown (7.5YR 3/4) loam, brown (7.5YR 5/4) dry; weak prismatic structure; slightly hard, very friable, nonsticky and slightly plastic; common fine and medium roots; few pebbles; moderately acid; clear wavy boundary.

C1—25 to 32 inches; brown (10YR 4/3) sandy loam, yellowish brown (10YR 5/4) dry; single grain; soft, very friable, nonsticky and nonplastic; few fine

roots; 15 percent pebbles; moderately acid; clear wavy boundary.

2C2—32 to 60 inches; brown (10YR 4/3) very gravelly coarse sand, yellowish brown (10YR 5/4) dry; single grain; loose; few fine roots; 40 percent pebbles; moderately acid.

The upper part of the particle-size control section is loam or fine sandy loam and is 5 to 15 percent clay. The lower part is loamy sand, sand, gravelly sand, or very gravelly sand and is 0 to 40 percent pebbles.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3 moist and 4 or 5 dry, and chroma of 2 or 3 moist and 2 to 4 dry. It is strongly acid or moderately acid.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 5 moist and 4 to 7 dry, and chroma of 3 or 4 moist or dry. It is fine sandy loam, loam, or silt loam. It is moderately acid or slightly acid.

The C horizon has hue of 10YR or 2.5Y, value of 3 to 5 moist and 5 or 6 dry, and chroma of 3 or 4 moist or dry. It is loamy sand, sand, or sandy loam. It is moderately acid to neutral.

The 2C horizon has hue of 10YR or 2.5Y, value of 3 to 5 moist and 4 to 6 dry, and chroma of 1 to 4 moist or dry. It is very gravelly sandy loam or coarse sand. It is moderately acid to neutral.

These soils are subject to occasional, brief periods of flooding in November through March.

Elkprairie Series

The Elkprairie series consists of very deep, well drained soils on terraces and hillslopes. These soils formed in volcanic ash and pumice. Slope is 0 to 30 percent. Elevation is 2,600 to 4,700 feet. The mean annual precipitation is 120 to 135 inches, the mean annual air temperature is about 40 degrees F, and the growing season is 75 to 95 days.

These soils are classified as ashy over medial Typic Cryorthents.

Typical pedon of Elkprairie loamy sand, 0 to 30 percent slopes; about 23 miles east of Toutle; 2,500 feet south and 1,000 feet west of the northeast corner of sec. 25, T. 10 N., R. 4 E.

C1—0 to 6 inches; dark gray (5Y 4/1) loamy sand, light gray (5Y 6/1) dry; massive; loose, friable, nonsticky and nonplastic; very strongly acid; abrupt smooth boundary.

C2—6 to 11 inches; dark gray (5Y 4/1) gravelly sand, light gray (5Y 4/1) dry; single grain; loose, nonsticky and nonplastic; 20 percent pumice fragments; very strongly acid; gradual wavy boundary.

C3—11 to 17 inches; dark gray (5Y 4/1) gravelly coarse sand, olive gray (5Y 5/2) dry; single grain; loose, nonsticky and nonplastic; 20 percent pumice fragments; very strongly acid; gradual wavy boundary.

C4—17 to 23 inches; very dark gray (10YR 3/1) very gravelly sand, gray (10YR 5/1) dry; single grain; loose, nonsticky and nonplastic; 30 percent pumice fragments and 10 percent pebbles; very strongly acid; abrupt smooth boundary.

2Ab—23 to 26 inches; very dark brown (10YR 2/2) fine sandy loam, very dark grayish brown (10YR 3/2) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and fine tubular pores; extremely acid; gradual wavy boundary.

2Bwb1—26 to 29 inches; brown (10YR 4/3) gravelly loam, yellowish brown (10YR 5/6) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic, weakly smeary; common very fine and fine tubular pores; 20 percent pumice fragments; NaF pH 11.5; very strongly acid; gradual wavy boundary.

2Bwb2—29 to 36 inches; reddish yellow (7.5YR 6/8) gravelly loam, yellow (10YR 7/8) dry; common medium distinct yellowish brown (10YR 5/4) mottles, yellowish brown (10YR 5/6) dry; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; 20 percent pumice fragments; NaF pH 11.5; very strongly acid; gradual wavy boundary.

2Bwb3—36 to 60 inches; yellowish brown (10YR 5/8) loam, yellow (10YR 8/8) dry; common medium distinct gray (5Y 5/1) mottles, light gray (5Y 7/1) dry; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic, weakly smeary; 10 percent pumice fragments; NaF pH 11.0; moderately acid.

Depth to the 2Bwb horizon is 20 to 35 inches. The particle-size control section is 60 to 80 percent volcanic glass and glass aggregates. The upper part of the particle-size control section is 10 to 30 percent pumice fragments. The profile is extremely acid to moderately acid.

The C horizon has hue of 2.5Y or 5Y, value of 3 or 4 moist and 4 to 7 dry, and chroma of 1 or 2 moist or dry. It is loamy sand to sand and is 10 to 30 percent pumice fragments.

The 2Ab horizon has value of 2 or 3 moist and 3 or 4 dry, and it has chroma of 1 or 2 moist or dry. It is fine sandy loam or sandy loam.

The 2Bwb horizon has hue of 7.5YR or 10YR, value of 4 to 6 moist and 5 to 8 dry, and chroma of 3 to 8 moist or dry. Mottling ranges from none to common.

The horizon has hue of 10YR to 5Y, value of 5 to 7 moist or dry, and chroma of 1 to 6 moist or dry. It is 10 to 25 percent pumice fragments.

Elochoman Series

The Elochoman series consists of very deep, well drained soils on hillslopes and mountainslopes. These soils formed in residuum derived dominantly from sandstone. Slope is 5 to 30 percent. Elevation is 400 to 1,700 feet. The mean annual precipitation is 70 to 120 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 200 to 240 days.

These soils are classified as medial, mesic Typic Dystrandepts.

Typical pedon of Elochoman silt loam, 5 to 30 percent slopes; about 6 miles west of Ryderwood; 700 feet west and 1,000 feet south of the northeast corner of sec. 10, T. 10 N., R. 4 W.

Oe—2 inches to 0; partially decomposed organic litter, including needles, leaves, twigs, cones, and bark chips; abrupt smooth boundary.

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 4/3) dry; moderate fine granular structure; soft, friable, nonsticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 10 percent shotlike aggregates 2 to 10 millimeters in diameter; moderately acid; clear wavy boundary.

A2—2 to 12 inches; dark brown (10YR 3/3) silt loam, yellowish brown (10YR 5/4) dry; moderate very fine and fine subangular blocky structure; soft, friable, nonsticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 15 percent shotlike aggregates 2 to 10 millimeters in diameter; moderately acid; clear wavy boundary.

Bw1—12 to 18 inches; dark yellowish brown (10YR 3/6) silt loam, yellowish brown (10YR 5/4) dry; moderate very fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 10 percent shotlike aggregates 2 to 10 millimeters in diameter; moderately acid; clear wavy boundary.

Bw2—18 to 26 inches; dark yellowish brown (10YR 4/6) silt loam, brownish yellow (10YR 6/6) dry; moderate medium subangular blocky structure parting to moderate fine subangular blocky; soft, very friable, nonsticky and slightly plastic, weakly smeary; many very fine, common fine, and few medium roots; many fine pores; strongly acid; gradual wavy boundary.

BC1—26 to 50 inches; yellowish brown (10YR 5/6) loam, yellow (10YR 7/6) dry; massive; very friable, nonsticky and slightly plastic, weakly smeary; common very fine and fine roots; few very fine pores; strongly acid; gradual wavy boundary.

BC2—50 to 60 inches; yellowish brown (10YR 5/6) loam, very pale brown (10YR 7/4) dry; massive; soft, very friable, nonsticky and slightly plastic; few fine pores; 10 percent pebble-sized soft sandstone fragments; strongly acid.

The particle-size control section averages 18 to 27 percent clay. The profile is moderately acid or strongly acid.

The A horizon has value of 2 or 3 moist and 3 to 5 dry, and it has chroma of 2 to 4 moist or dry.

The Bw horizon has value of 3 to 5 moist and 5 to 7 dry, and it has chroma of 3 to 6 moist and 4 to 6 dry.

The BC horizon has value of 4 or 5 moist and 6 or 7 dry, and it has chroma of 4 to 8 moist or dry. It is loam or silt loam.

Ferteg Series

The Ferteg series consists of very deep, moderately well drained soils on benches, terraces, and hillslopes. These soils formed in alluvial and eolian deposits of volcanic ash overlying dense glaciofluvial deposits. Slope is 0 to 30 percent. Elevation is 700 to 1,700 feet. The mean annual precipitation is 60 to 65 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 175 to 240 days.

These soils are classified as medial over loamy, mixed, mesic Aquic Dystrandepts.

Typical pedon of Ferteg silt loam, 8 to 30 percent slopes; about 10 miles east of Toutle; 1,000 feet south and 2,500 feet west of the northeast corner of sec. 27, T. 10 N., R. 2 E.

Oe—3 inches to 0; loose, partially decomposed organic litter and charcoal; fine roots; abrupt wavy boundary.

A—0 to 6 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common fine and medium roots; 10 percent shotlike aggregates 1 to 4 millimeters in diameter; strongly acid; clear wavy boundary.

Bw1—6 to 14 inches; dark yellowish brown (10YR 4/4) silt loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common fine and medium roots; 5 percent shotlike

aggregates 1 to 4 millimeters in diameter; strongly acid; clear wavy boundary.

Bw2—14 to 25 inches; brown (10YR 4/3) silt loam, yellowish brown (10YR 5/4) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common fine roots; moderately acid; clear wavy boundary.

2Bw3—25 to 34 inches; brown (10YR 4/3) silty clay loam, pale brown (10YR 6/3) dry; common medium faint grayish brown (10YR 5/2) and dark reddish brown (5YR 3/4) mottles; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common fine roots; moderately acid; clear wavy boundary.

2C—34 to 60 inches; yellowish brown (10YR 5/4) silty clay loam, very pale brown (10YR 7/3) dry; common coarse prominent yellowish red (5YR 4/6) and light brownish gray (10YR 6/2) mottles; massive; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; strongly acid.

Depth to glaciofluvial deposits is 25 to 36 inches. The profile is moderately acid or strongly acid throughout.

The A horizon has value of 2 or 3 moist and 4 or 5 dry, and it has chroma of 2 or 3 moist or dry.

The Bw horizon has value of 4 to 6 moist and 5 to 7 dry, and it has chroma of 3 to 6 moist or dry. The lower part has mottles that have chroma of 6 or less. The horizon is silt loam.

The 2Bw horizon has value of 4 to 6 moist and 6 to 8 dry, and it has chroma of 3 to 6 moist or dry. It has faint to prominent mottles. It is silt loam or silty clay loam.

The 2C horizon has value of 5 or 6 moist and 7 or 8 dry, and it has chroma of 1 to 4 moist or dry. It has distinct or prominent mottles that have chroma of 1 to 6 moist. It is silty clay loam or silty clay.

Depth to the perched high water table is 2.5 to 3.5 feet in December through March.

Forsyth Series

The Forsyth series consists of very deep, somewhat excessively drained soils on fans, terraces, and terrace escarpments. These soils formed in pyroclastic flow material and lahar with an admixture of volcanic ash and pumice. Slope is 0 to 90 percent. Elevation is 1,600 to 2,800 feet. The mean annual precipitation is 110 to 130 inches, the mean annual air temperature is about 43 degrees F, and the growing season is 120 to 140 days.

These soils are classified as sandy-skeletal, mixed, frigid Andeptic Udorthents.

Typical pedon of Forsyth very cobbly loamy sand, 0 to 30 percent slopes; near gravel pit just south of the Kalama River and about 1.5 miles north of Merrill Lake; 200 feet south and 725 feet east of the northwest corner of sec. 4, T. 7 N., R. 4 E.

Oe—2 inches to 0; loose, partially decomposed organic litter, including needles, twigs, bark, and cones; 3 percent rounded cobbles on soil surface; abrupt smooth boundary.

E—0 to 1 inch; very dark gray (10YR 3/1) very cobbly loamy sand (volcanic ash), gray (10YR 6/1) dry; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; many fine pores; 25 percent rounded pebbles and 25 percent rounded cobbles; 5 percent bleached pebble-sized pumice fragments; moderately acid; abrupt irregular boundary.

Bw—1 inch to 7 inches; dark brown (10YR 3/3) very cobbly loamy sand (volcanic ash), light brownish gray (10YR 6/2) dry; few fine faint dark yellowish brown (10YR 4/4) mottles; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; many fine pores; 30 percent rounded pebbles, 25 percent rounded cobbles, and 5 percent pebble-sized pumice fragments; slightly acid; abrupt wavy boundary.

2C1—7 to 17 inches; very dark grayish brown (10YR 3/2) extremely cobbly sand, light brownish gray (10YR 6/2) dry; single grain; loose; many fine, medium, and coarse roots; 30 percent rounded pebbles, 35 percent rounded cobbles, and 5 percent pebble-sized pumice fragments; slightly acid; abrupt wavy boundary.

2C2—17 to 32 inches; very dark gray (10YR 3/1) very gravelly sand, gray (10YR 6/1) dry; single grain; loose; few fine roots; 35 percent rounded pebbles, 15 percent rounded cobbles, and 5 percent pebble-sized pumice fragments; slightly acid; clear wavy boundary.

2C3—32 to 60 inches; dark gray (10YR 4/1) extremely cobbly sand, gray (10YR 6/1) and light gray (10YR 7/1) dry; single grain; loose; few fine roots; 20 percent rounded pebbles, 40 percent rounded cobbles, and 10 percent rounded pebble-sized pumice fragments; slightly acid.

The mantle of volcanic ash is 7 to 14 inches thick. The particle-size control section averages 50 to 85 percent rock fragments throughout, including rounded pebbles, cobbles, and occasional stones. The profile

averages 5 to 20 percent pumice fragments throughout, and most of the fragments are rounded and bleached. In some pedons 3 to 5 percent of the surface is covered with stones and a few boulders. In some pedons rounded cobbles and stone-sized pumice fragments are on the surface. The profile is moderately acid to neutral throughout.

The E horizon has value of 5 to 7 dry and chroma of 1 or 2 moist or dry. It is 20 to 30 percent pebbles and 20 to 30 percent cobbles. It is 0 to 10 percent pumice fragments.

The Bw horizon has value of 5 or 6 dry and chroma of 2 or 3 moist or dry. It is loamy sand or sandy loam and is gravelly, very gravelly, very cobbly, or extremely cobbly. The horizon is 20 to 40 percent pebbles and 10 to 40 percent cobbles. It is 0 to 15 percent pumice fragments.

The C horizon has value of 3 or 4 moist and 6 or 7 dry, and it has chroma of 1 to 3 moist or dry. It is very gravelly sand, extremely stony sand, or extremely cobbly sand. It is single grain or massive. The horizon is 30 to 40 percent pebbles and 15 to 40 percent cobbles and stones. It is 5 to 20 percent pumice fragments.

Germany Series

The Germany series consists of deep and very deep, well drained soils on plateaus, ridgetops, benches, and hillslopes. These soils formed in residuum and colluvium derived from basalt and tuff with a mantle of loess and volcanic ash. Slope is 0 to 65 percent. Elevation is 200 to 1,400 feet. The mean annual precipitation is 50 to 70 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 200 to 240 days.

These soils are classified as clayey, oxidic, mesic Typic Palehumults.

Typical pedon of Germany silt loam, 20 to 30 percent slopes; about 8 miles northwest of Longview; 220 feet east and 750 feet south of the northwest corner of sec. 3, T. 8 N., R. 3 W.

Oe—2 inches to 0; partially decomposed organic litter, including needles, leaves, twigs, and bark; abrupt smooth boundary.

A1—0 to 2 inches; very dark brown (10YR 2/2) silt loam, dark brown (7.5YR 3/2) dry; moderate medium granular structure; soft, very friable, nonsticky and nonplastic, weakly smeary; many fine, medium, and coarse roots; few shotlike aggregates; few angular pebbles; very strongly acid; abrupt wavy boundary.

A2—2 to 22 inches; dark brown (10YR 3/3) silt loam, dark brown (7.5YR 4/4) dry; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic, weakly smeary; many fine, medium, and coarse roots; common fine tubular and interstitial pores; few angular pebbles; common fine shotlike aggregates; strongly acid; diffuse wavy boundary.

2BAt—22 to 49 inches; brown (10YR 4/3) silt loam, yellowish brown (10YR 5/4) dry; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common fine and medium roots; common fine tubular and interstitial pores; faint patchy clay films on peds; common fine shotlike aggregates; few angular pebbles; strongly acid; clear smooth boundary.

2Bt—49 to 72 inches; brown (7.5YR 4/4) silt loam, yellowish brown (10YR 5/4) dry; moderate fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic, weakly smeary; few fine roots to a depth of 60 inches; common fine tubular pores; faint patchy clay films on peds; common fine shotlike aggregates; strongly acid.

Depth to bedrock is 40 to 60 inches or more. The solum is 0 to 10 percent rock fragments. It is 40 to 60 inches thick or more. The umbric epipedon is 20 to 30 inches thick. The A and 2BAt horizons are moderately acid or strongly acid, and the 2Bt horizon is strongly acid or very strongly acid.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3 moist and 3 or 4 dry, and chroma of 2 to 4 moist or dry. It is 0 to 25 percent soft concretions.

The 2BAt and 2Bt horizons have hue of 7.5YR or 10YR, value of 3 or 4 moist and 4 or 5 dry, and chroma of 3 or 4 moist or dry. The upper part of these horizons is 0 to 25 percent soft concretions. Apparent field texture is silt loam or silty clay loam.

Gobar Series

The Gobar series consists of deep, well drained soils on benches, hillslopes, mountainslopes, and broad ridgetops. These soils formed in residuum and colluvium derived from tuff and tuffaceous breccia with a mantle of volcanic ash and loess. Slope is 5 to 90 percent. Elevation is 500 to 1,800 feet. The mean annual precipitation is 70 to 90 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 175 to 200 days.

These soils are classified as medial, mesic Andic Haplumbrepts.

Typical pedon of Gobar silt loam, 30 to 65 percent slopes; about 15 miles east of Kelso; 730 feet south

and 730 feet east of the northwest corner of sec. 29, T. 8 N., R. 2 E.

Oe—2 inches to 0; loose, partially decomposed organic litter, including needles, leaves, twigs, bark chips, cones, and roots; abrupt smooth boundary.

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine roots, common fine and medium roots, and few coarse roots; many fine pores; 10 percent shotlike aggregates 2 to 5 millimeters in diameter; moderately acid; clear wavy boundary.

A2—3 to 10 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine roots, common fine roots, and few medium roots; many fine pores; 10 percent shotlike aggregates 2 to 5 millimeters in diameter; moderately acid; clear wavy boundary.

Bw1—10 to 15 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine roots, common fine roots, and few medium roots; many fine pores; moderately acid; clear wavy boundary.

Bw2—15 to 25 inches; yellowish brown (10YR 5/4) silt loam, light yellowish brown (10YR 6/4) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine and few fine roots; many fine pores; 20 percent subangular soft pebble-sized tuff fragments; moderately acid; clear wavy boundary.

C—25 to 46 inches; yellowish brown (10YR 5/4) silt loam, light yellowish brown (10YR 6/4) dry; massive; slightly hard, firm, slightly sticky and slightly plastic, weakly smeary; few very fine, fine, and medium roots; few pores; 80 percent angular and subangular, soft, pebble- and cobble-sized tuff fragments with silt films and fine roots on fracture planes; strongly acid; abrupt irregular boundary.

Cr—46 to 56 inches; multicolored, highly weathered and fractured tuff with black stains; few fine roots on fracture planes.

Depth to bedrock is 40 to 60 inches. The particle-size control section averages 15 to 55 percent pebble- and cobble-sized weathered tuff and tuffaceous breccia fragments. The profile is 0 to 10 percent rock fragments that are colluvial in origin. It is slightly acid to strongly acid throughout.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 moist and 3 to 5 dry, and chroma of 2 or 3 moist or dry.

The Bw horizon has hue of 10YR or 7.5YR, value of 3 to 5 moist and 5 to 7 dry, and chroma of 3 to 6 moist or dry. It is silt loam, silty clay loam, or clay loam.

The C horizon has hue of 2.5Y to 7.5YR, value of 4 or 5 moist and 5 to 8 dry, and chroma of 4 to 8 moist or dry. Color of the highly weathered tuff varies greatly from pedon to pedon, and it can be multicolored in a single pedon. The horizon is silt loam, silty clay loam, or clay loam.

Godfrey Series

The Godfrey series consists of very deep, poorly drained soils in depressions on flood plains. These soils formed in mixed alluvium. Slope is 0 to 3 percent. Elevation is 20 to 300 feet. The mean annual precipitation is 40 to 65 inches, the mean annual air temperature is about 52 degrees F, and the growing season is 215 to 240 days.

These soils are classified as fine, mixed, nonacid, mesic Typic Fluvaquents.

Typical pedon of Godfrey silt loam, 0 to 3 percent slopes; about 5 miles north of Kelso; 2,150 feet west and 2,000 feet south of the northeast corner of sec. 2, T. 8 N., R. 2 W.

A—0 to 5 inches; dark gray (10YR 4/1) silt loam, light brownish gray (10YR 6/2) dry; common fine distinct dark reddish brown (5YR 3/4) mottles, yellowish red (5YR 4/8) dry; moderate fine subangular blocky structure; hard, friable, slightly sticky and plastic; many fine and medium roots; many fine tubular pores; very strongly acid; gradual smooth boundary.

Bg—5 to 27 inches; gray (10YR 5/1) silty clay loam, gray (10YR 6/1) dry; many medium distinct yellowish red (5YR 4/6) mottles, yellowish red (5YR 4/8) dry; weak coarse prismatic structure parting to weak medium subangular blocky and weak medium angular blocky; hard, firm, sticky and plastic; many fine roots between depths of 5 and 8 inches and common fine roots between depths of 8 and 27 inches; many fine and common tubular pores; moderately acid; gradual smooth boundary.

Cg1—27 to 33 inches; dark gray (5Y 4/1) sandy clay, grayish brown (10YR 5/2) dry; few medium distinct yellowish red (5YR 4/6) mottles; massive; slightly hard, firm, sticky and plastic; many fine roots;

common medium tubular pores; neutral; gradual smooth boundary.

Cg2—33 to 60 inches; dark gray (5Y 4/1) clay, gray (10YR 5/1) dry; common fine prominent reddish brown (5YR 5/4) mottles when dry; massive; very hard, firm, sticky and very plastic; common medium tubular pores; neutral.

The particle-size control section averages 35 to 50 percent clay. The solum is 20 to 30 inches thick.

The A horizon has value of 3 to 5 moist and 5 to 7 dry, and it has chroma of 1 or 2 moist or dry. It is very strongly acid to moderately acid.

The Bg horizon has hue of 10YR to 5Y, value of 3 to 5 moist and 5 to 7 dry, and chroma of 0 or 1 moist or dry. It is silty clay loam, silty clay, or clay. It is moderately acid or slightly acid.

The Cg horizon has hue of 10YR to 5Y, value of 4 to 6 moist and 6 to 8 dry, and chroma of 0 to 2 moist or dry. It is clay, clay loam, silty clay, sandy clay, or silty clay loam. It is slightly acid or neutral.

An apparent high water table is at the surface to a depth of 2 feet in November through March. These soils are subject to occasional, brief periods of flooding in November through March.

Greenwater Series

The Greenwater series consists of very deep, somewhat excessively drained soils on low river terraces and terrace escarpments. These soils formed in mixed alluvium and pumice and aerially deposited volcanic ash. Slope is 0 to 45 percent. Elevation is 100 to 700 feet. The mean annual precipitation is 40 to 70 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 200 to 240 days.

These soils are classified as mixed, mesic Dystric Xeropsamments.

Typical pedon of Greenwater fine sandy loam, 0 to 8 percent slopes; about 4 miles northwest of Toutle; 1,100 feet east and 2,200 feet north of the southwest corner of sec. 2, T. 10 N., R. 1 W.

Oi—5 to 2 inches; leaves, needles, and bark; abrupt smooth boundary.

Oe—2 inches to 0; decomposed organic litter; abrupt smooth boundary.

A—0 to 8 inches; dark brown (10YR 3/3) fine sandy loam, yellowish brown (10YR 5/6) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; few fine and medium roots; many fine pores; 10 percent pumice fragments; neutral; abrupt smooth boundary.

Bw—8 to 22 inches; brown (10YR 4/3) fine sand, pale brown (10YR 6/3) dry; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; few fine roots; many fine irregular pores and common fine tubular pores; 10 percent pumice fragments; neutral; clear wavy boundary.

C1—22 to 36 inches; very dark grayish brown (10YR 3/2) fine sand, grayish brown (10YR 5/2) dry; single grain; loose; weakly smeary; few fine roots; many fine and medium pores; 10 percent pumice fragments; neutral; clear wavy boundary.

C2—36 to 60 inches; dark grayish brown (10YR 4/2) fine sand, grayish brown (10YR 5/2) dry; single grain; loose; weakly smeary; many fine and medium pores; 10 percent pumice fragments; neutral.

The particle-size control section is less than 15 percent rock fragments and is 5 to 25 percent volcanic ash, cinders, and pumice. The profile is moderately acid to neutral throughout.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 4 moist and 3 to 5 dry, and chroma of 2 or 3 moist and 3 to 6 dry. It is loamy sand to fine sandy loam.

The Bw horizon has hue of 10YR or 2.5Y, value of 3 or 4 moist and 5 or 6 dry, and chroma of 2 or 3 moist or dry.

The C horizon has hue of 10YR, value of 3 or 4 moist and 5 or 6 dry, and chroma of 1 or 2 moist or dry. It is fine sand or gravelly fine sand.

Hatchet Series

The Hatchet series consists of moderately deep, well drained soils on mountainslopes and ridgetops. These soils formed in residuum and colluvium derived dominantly from andesite with a mantle of volcanic ash and pumice. Slope is 30 to 90 percent. Elevation is 2,800 to 4,500 feet. The mean annual precipitation is 80 to 120 inches, the mean annual air temperature is about 39 degrees F, and the growing season is 90 to 140 days.

These soils are classified as medial-skeletal Typic Cryorthods.

Typical pedon of Hatchet very cobbly sandy loam, 30 to 65 percent slopes; about 18 miles east of Toutle; 2,230 feet north and 2,100 feet west of the southeast corner of sec. 18, T. 10 N., R. 4 E.

Oe—4.0 to 2.5 inches; loose, partially decomposed organic litter, including needles, twigs, cones, wood, and bark chips; abrupt smooth boundary.

Oa—2.5 inches to 0; decomposed organic material; abrupt smooth boundary.

E—0 to 1 inch; dark gray (10YR 4/1) sandy loam, gray (10YR 6/1) dry; massive; soft, very friable, nonsticky and nonplastic, weakly smeary; few roots; strongly acid; abrupt wavy boundary.
Bs1—1 inch to 5 inches; dark brown (7.5YR 3/4) very cobbly sandy loam, brown (7.5YR 5/4) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic, weakly smeary; common very fine, fine, medium, and coarse roots; many fine pores; 20 percent angular and subangular pebbles and 20 percent cobbles; moderately acid; clear wavy boundary.
Bs2—5 to 11 inches; brown (7.5YR 4/4) very cobbly sandy loam, light brown (7.5YR 6/4) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic, weakly smeary; common very fine, fine, medium, and coarse roots; common fine pores; 25 percent angular and subangular pebbles and 20 percent cobbles; moderately acid; clear wavy boundary.
Bs3—11 to 21 inches; brown (7.5YR 4/4) extremely cobbly loam, pink (7.5YR 7/4) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic, weakly smeary; common very fine, fine, medium, and coarse roots; common fine pores; 20 percent angular and subangular pebbles and 45 percent cobbles; moderately acid; clear irregular boundary.
C1—21 to 30 inches; dark yellowish brown (10YR 4/4) extremely cobbly sandy loam, very pale brown (10YR 7/4) dry; massive; slightly hard, friable, slightly sticky and nonplastic, weakly smeary; common very fine and fine roots and few medium and coarse roots; few fine pores; 40 percent angular and subangular pebbles and 40 percent cobbles; slightly acid; abrupt irregular boundary.
C2—30 to 36 inches; yellowish brown (10YR 5/4) extremely cobbly sandy loam, very pale brown (10YR 7/3) dry; massive; slightly hard, friable, slightly sticky and nonplastic, weakly smeary; 40 percent angular pebbles and 45 percent cobbles; slightly acid; abrupt irregular boundary.
R—36 inches; fractured porphyritic andesite.

Depth to bedrock is 20 to 40 inches. The particle-size control section is 60 to 90 percent rock fragments. Some pedons have a small admixture of pumice fragments in the upper part of the profile. The profile is slightly acid or moderately acid below the E horizon.

The E horizon has hue of 10YR to 2.5Y, value of 3 to 5 moist and 4 to 8 dry, and chroma of 0 to 3 moist or dry.

The Bs horizon has hue of 5YR to 7.5YR, value of 3 to 5 moist and 5 to 7 dry, and chroma of 4 to 6 moist or dry. It is very cobbly sandy loam, very cobbly loam, extremely cobbly loam, or extremely cobbly sandy loam. It is 20 to 30 percent pebbles and 30 to 50 percent cobbles.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5 moist and 6 or 7 dry, and chroma of 3 or 4 moist or dry. It is 30 to 45 percent pebbles and 40 to 45 percent cobbles. It is extremely cobbly sandy loam, extremely cobbly loam, or extremely cobbly clay loam.

Hazeldell Series

The Hazeldell series consist of deep and very deep, well drained soils on hillslopes. These soils formed in residuum and colluvium derived from basalt. Slope is 5 to 65 percent. Elevation is 200 to 1,800 feet. The mean annual precipitation is 40 to 70 inches, the mean annual air temperature is about 51 degrees F, and the growing season is 175 to 240 days.

These soils are classified as clayey, mixed, mesic Xeric Palehumults.

Typical pedon of Hazeldell gravelly silt loam, 8 to 20 percent slopes; about 6 miles southeast of Castle Rock; 2,000 feet west and 1,400 feet south of the northeast corner of sec. 27, T. 9 N., R. 1 W.

Oe—2 inches to 0; needles, leaves, and twigs in various stages of decomposition; abrupt smooth boundary.
A—0 to 3 inches; dark brown (7.5YR 3/3) gravelly silt loam, brown (7.5YR 5/3) dry; weak medium subangular blocky structure parting to moderate medium granular; soft, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots throughout; many fine to coarse interstitial pores; 20 percent pebbles; many medium and common coarse rounded ironstone nodules; very strongly acid; clear smooth boundary.
AB—3 to 7 inches; dark brown (7.5YR 3/3) gravelly silt loam, light brown (7.5YR 6/4) dry; weak medium subangular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots throughout; many fine and medium interstitial pores; 20 percent pebbles; many medium and common coarse rounded ironstone nodules; very strongly acid; clear smooth boundary.
BAt—7 to 13 inches; dark brown (7.5YR 3/4) gravelly

clay loam, light brown (7.5YR 6/4) dry; moderate medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; very few faint clay films on faces of peds; many fine and common coarse roots; many fine and medium interstitial and tubular pores; 25 percent pebbles; common medium rounded ironstone nodules; strongly acid; clear smooth boundary.

Bt1—13 to 28 inches; brown (7.5YR 4/4) gravelly clay loam, light brown (7.5YR 6/4) dry; moderate medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, firm, sticky and plastic; very few faint clay films on faces of peds; many fine and common coarse roots; many fine and medium interstitial and tubular pores; 5 percent cobbles and 25 percent pebbles; strongly acid; gradual smooth boundary.

Bt2—28 to 40 inches; brown (7.5YR 4/4) very gravelly clay loam, light brown (7.5YR 6/4) dry; moderate medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, firm, sticky and plastic; common distinct discontinuous clay films on faces of peds; common fine and few coarse roots; many fine and medium interstitial and tubular pores; 10 percent cobbles and 40 percent pebbles; strongly acid; gradual wavy boundary.

BCt—40 to 60 inches; yellowish red (5YR 4/6) very gravelly clay loam, pink (7.5YR 7/4) dry; weak medium subangular blocky structure parting to weak fine subangular blocky; slightly hard, firm, slightly sticky and plastic, weakly smeary; common discontinuous clay films on faces of peds; few fine and medium roots; many fine and medium interstitial and tubular pores; 20 percent cobbles and 50 percent pebbles; strongly acid.

Depth to bedrock is 40 to 60 inches or more. The solum has hue of 10YR to 5YR throughout. The profile is strongly acid or very strongly acid. The particle-size control section averages 35 to 60 percent clay.

The A and AB horizons have value of 2 or 3 moist and 3 to 6 dry, and they have chroma of 2 to 4 moist or dry. They are gravelly silt loam or gravelly loam.

The Bt horizon has value of 3 or 4 moist and 4 to 7 dry, and it has chroma of 3 to 6 moist or dry. The upper 20 inches is gravelly clay loam or gravelly loam, and the lower part ranges to very gravelly clay loam.

Hoffstadt Series

The Hoffstadt series consists of deep, well drained soils on mountainslopes, benches, and ridgetops. These soils formed in residuum and colluvium derived dominantly from basalt with a mantle of volcanic ash. Slope is 5 to 90 percent. Elevation is 1,800 to 2,800 feet. The mean annual precipitation is 70 to 90 inches, the mean annual air temperature is about 43 degrees F, and the growing season is 150 to 180 days.

These soils are classified as medial-skeletal, frigid Andic Dystrochrepts.

Typical pedon of Hoffstadt very gravelly sandy loam, 30 to 65 percent slopes; about 19 miles southwest of Toutle; 2,000 feet north and 1,400 feet west of the southeast corner of sec. 1, T. 9 N., R. 3 E.

Oe—2 inches to 0; loose, partially decomposed organic litter, including needles, leaves, twigs, cones, and bark chips; abrupt smooth boundary.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) very gravelly sandy loam, grayish brown (10YR 5/2) dry; weak very fine granular and subangular blocky structure; soft, very friable, slightly sticky and nonplastic, weakly smeary; many fine pores; 30 percent angular and subangular pebbles and 10 percent cobbles; moderately acid; clear wavy boundary.

Bw1—4 to 10 inches; dark yellowish brown (10YR 4/4) very gravelly sandy loam, light yellowish brown (10YR 6/4) dry; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, and medium roots and common coarse roots; many fine pores; 30 percent angular and subangular pebbles and 10 percent cobbles; slightly acid; clear wavy boundary.

Bw2—10 to 19 inches; dark yellowish brown (10YR 4/6) very cobbly sandy loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic, weakly smeary; many very fine, fine, and medium roots and common coarse roots; many fine pores; 25 percent angular and subangular pebbles and 25 percent cobbles; slightly acid; clear wavy boundary.

BC—19 to 47 inches; brown (7.5YR 4/4) extremely stony sandy loam, pale brown (10YR 6/3) dry; weak fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic, weakly smeary; common very fine, fine, medium, and coarse roots; common fine pores; 5 percent angular and subangular pebbles, 5 percent cobbles, and 65 percent angular stones 10 to 24 inches in diameter; moderately acid; abrupt irregular boundary.

R—47 inches; fractured, hard olivine basalt.

Depth to bedrock is 40 to 60 inches. The particle-size control section averages 60 to 80 percent rock fragments. Some pedons have a small admixture of pumice fragments in the upper part of the profile. The profile is slightly acid or moderately acid throughout.

The A horizon has hue of 10YR or 7.5YR, value of 2 to 4 moist and 4 or 5 dry, and chroma of 2 or 3 moist or dry. It is 25 to 35 percent pebbles and 10 to 15 percent cobbles. It is very gravelly sandy loam or loamy sand.

The Bw horizon has hue of 10YR to 5YR, value of 3 to 5 moist and 4 to 7 dry, and chroma of 4 to 6 moist or dry. It is 20 to 35 percent pebbles, 10 to 30 percent cobbles, and 0 to 50 percent stones.

The BC horizon and the C horizon, where present, have hue of 10YR or 7.5YR, value of 4 or 5 moist and 5 to 7 dry, and chroma of 3 to 6 moist or dry. They are 5 to 30 percent pebbles and 50 to 60 percent cobbles and stones.

Jonas Series

The Jonas series consists of very deep, well drained soils on benches, hillslopes, and broad ridgetops. These soils formed in residuum and colluvium derived dominantly from andesite and andesitic volcanic breccia with a mantle of volcanic ash in the upper part. Slope is 5 to 65 percent. Elevation is 1,800 to 2,800 feet. The mean annual precipitation is 60 to 90 inches, the mean annual air temperature is about 43 degrees F, and the growing season is 140 to 190 days.

These soils are classified as medial, frigid Andic Haplumbrepts.

Typical pedon of Jonas silt loam, 30 to 65 percent slopes; about 8 miles southeast of Toutle; 2,600 feet east and 50 feet south of the northwest corner of sec. 36, T. 9 N., R. 1 E.

Oe—2 inches to 0; loose, partially decomposed needles, twigs, and bark chips; abrupt smooth boundary.

A1—0 to 8 inches; very dark brown (10YR 2/2) silt loam, brown (10YR 4/3) dry; strong fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic, weakly smeary; many very fine and fine roots and common coarse roots; many fine irregular pores; 30 percent shotlike aggregates 2 to 5 millimeters in diameter and 10 percent pebbles; moderately acid; clear wavy boundary.

A2—8 to 18 inches; dark brown (10YR 3/3) very gravelly silt loam, brown (10YR 5/3) dry; strong very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine and fine roots and common coarse roots; many fine irregular pores; 25 percent andesite pebbles and 10 percent andesite cobbles; moderately acid; clear wavy boundary.

Bw1—18 to 29 inches; dark yellowish brown (10YR 3/4) gravelly clay loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure parting to moderate very fine subangular blocky; slightly hard, firm, slightly sticky and slightly plastic, weakly smeary; many very fine and common fine roots; common very fine and fine pores; 20 percent andesite pebbles and 10 percent andesite cobbles; moderately acid; clear wavy boundary.

Bw2—29 to 46 inches; dark yellowish brown (10YR 4/4) cobbly clay loam, yellowish brown (10YR 5/4) dry; moderate medium and coarse subangular blocky structure; hard, firm, slightly sticky and plastic; common very fine and few fine roots; few fine pores; 10 percent andesite pebbles and 10 percent andesite cobbles; moderately acid; clear wavy boundary.

Bw3—46 to 60 inches; dark yellowish brown (10YR 3/6) cobbly clay loam, yellowish brown (10YR 5/6) dry; weak medium and coarse subangular blocky structure; hard, firm, slightly sticky and plastic; few very fine roots; few fine pores; 20 percent andesite pebbles and 30 percent andesite cobbles; moderately acid.

The particle-size control section averages 15 to 35 percent rock fragments. The profile is moderately acid or strongly acid throughout.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 moist and 4 or 5 dry, and chroma of 2 or 3 moist or dry. The upper part is 10 to 20 percent pebbles, and the lower part is 25 to 30 percent pebbles and 10 to 20 percent cobbles. The lower part is very gravelly silt loam, very cobbly silt loam, or very cobbly loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 or 4 moist and 5 to 7 dry, and chroma of 3 or 4 moist and 3 to 6 dry. It is cobbly loam, cobbly clay loam, or gravelly clay loam. It is 10 to 20 percent pebbles and 10 to 30 percent cobbles.

Kalama Series

The Kalama series consists of very deep, moderately well drained soils on high terraces and terrace escarpments. These soils formed in old gravelly alluvium. Slope is 8 to 60 percent. Elevation is 100 to 500 feet. The mean annual precipitation is 45 to 60 inches, the mean annual air temperature is about

51 degrees F, and the growing season is 220 to 240 days.

These soils are classified as fine-loamy, mixed, mesic Aquic Palexeralfs.

Typical pedon of Kalama gravelly loam, 15 to 30 percent slopes; about 2 miles northeast of Kelso; 75 feet south and 700 feet west of the northeast corner of sec. 23, T. 8 N., R. 2 W.

A—0 to 7 inches; very dark brown (10YR 2/2) gravelly loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; many fine and medium roots; many fine tubular pores; 20 percent rounded pebbles; slightly acid; clear wavy boundary.

E—7 to 17 inches; brown (10YR 4/3) gravelly loam, pale brown (10YR 6/3) dry; moderate fine and very fine subangular blocky structure; hard, firm, sticky and slightly plastic; many fine and medium roots; many fine tubular pores; few thin clay films in pores; 20 percent rounded pebbles; strongly acid; clear wavy boundary.

Bt/E—17 to 21 inches; variegated, brown (7.5YR 4/2) gravelly clay loam (Bt part), brown (7.5YR 5/4) dry, and brown (10YR 4/3) loam (E part), very pale brown (10YR 7/4) dry; few medium prominent reddish brown (5YR 4/4) mottles, yellowish red (5YR 4/6) dry; moderate fine and strong medium subangular blocky structure; hard, firm, sticky and plastic; common fine and medium roots; many fine tubular pores; many moderately thick clay films on pebbles and on some faces of peds; 25 percent rounded pebbles; moderately acid; clear wavy boundary.

Bt1—21 to 31 inches; variegated, brown (10YR 4/3 and 7.5YR 4/2) gravelly clay loam, very pale brown (10YR 7/4) and strong brown (7.5YR 5/6) dry; moderate very fine and strong fine subangular blocky structure; hard, firm, sticky and plastic; common fine roots; many fine tubular pores; many distinct clay films on pebbles and faces of peds; 25 percent rounded pebbles; moderately acid; clear wavy boundary.

Bt2—31 to 60 inches; brownish yellow (10YR 6/6) very gravelly clay loam, yellow (10YR 7/6) dry; moderate coarse subangular blocky structure; hard, firm, sticky and plastic; common fine tubular pores; few faint clay films on pebbles; 40 percent rounded pebbles; moderately acid.

The particle-size control section averages 18 to 35 percent clay and 15 to 35 percent rock fragments.

The A horizon has value and chroma of 2 or 3 moist. It is slightly acid or moderately acid.

The E horizon has value of 4 or 5 moist and 5 or 6 dry, and it has chroma of 3 moist or dry. It is gravelly silt loam or gravelly loam. It is slightly acid to strongly acid.

The Bt part of the Bt/E horizon has hue of 7.5YR, value of 4 or 5 moist and 5 to 7 dry, and chroma of 2 to 4 moist or dry. The E part has hue of 10YR, value of 4 or 5 moist and 7 or 8 dry, and chroma of 2 to 4 moist or dry. It is gravelly clay loam, gravelly loam, or gravelly silty clay loam. It is moderately acid or strongly acid.

The Bt horizon has hue of 7.5YR or 10YR, value of 3 to 6 moist or dry, and chroma of 2 to 8 moist or dry. The upper part is gravelly loam or gravelly clay loam, and the lower part is very gravelly loam, very gravelly clay loam, or gravelly clay loam. The horizon averages 18 to 35 percent clay. It is moderately acid or strongly acid. It is 35 to 60 percent rock fragments.

Depth to the perched high water table is 2.5 to 5.0 feet in December through March.

Katula Series

The Katula series consists of moderately deep, well drained soils on convex mountainslopes and ridgetops. These soils formed in weathered basalt. Slope is 30 to 90 percent. Elevation is 700 to 1,800 feet. The mean annual precipitation is 70 to 110 inches, the mean annual air temperature is about 48 degrees F, and the growing season is 180 to 220 days.

These soils are classified as medial-skeletal, mesic Andic Haplumbrepts.

Typical pedon of Katula very cobbly loam, 30 to 65 percent slopes; 6 miles west of Ryderwood; about 300 feet north and 1,500 feet east of the southwest corner of sec. 2, T. 10 N., R 4 W.

Oi—4 to 2 inches; accumulation of Douglas fir and western hemlock needles and twigs; clear smooth boundary.

Oa—2 inches to 0; decomposed needles and twigs; abrupt smooth boundary.

A1—0 to 5 inches; dark reddish brown (5YR 3/2) very cobbly loam, reddish brown (5YR 4/4) dry; moderate fine and medium granular structure; slightly hard, very friable, nonsticky and nonplastic, weakly smeary; many very fine and fine roots, common coarse roots, and few medium roots; many fine tubular and interstitial pores; 40 percent cobbles and 15 percent pebbles; moderately acid; clear smooth boundary.

A2—5 to 15 inches; dark reddish brown (5YR 3/3) very cobbly loam, yellowish red (5YR 4/6) dry; strong fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic, weakly

smeary; many very fine and fine roots and common coarse and medium roots; many fine tubular and interstitial pores; 45 percent cobbles and 10 percent pebbles; moderately acid; abrupt smooth boundary.

Bw—15 to 30 inches; brown (10YR 4/3) extremely cobbly clay loam, brown (10YR 4/3) dry; moderate very fine and fine subangular blocky structure; slightly hard, firm, sticky and plastic; common fine and few very fine roots; common fine tubular and irregular pores; 70 percent cobbles and 10 percent pebbles; moderately acid (pH 5.8); abrupt smooth boundary.

R—30 inches; basalt that is fractured in the upper part.

Depth to bedrock is 20 to 40 inches. The particle-size control section averages 60 to 80 percent, by volume, angular cobbles, pebbles, and stones. The content of rock fragments increases as depth increases.

The A horizon has hue of 5YR to 10YR, value of 2 or 3 moist and 2 to 4 dry, and chroma of 2 or 3 moist and 3 to 6 dry. It is 35 to 45 percent cobbles and 15 to 40 percent pebbles.

The Bw horizon has hue of 5YR to 10YR, value of 4 or 5 moist or dry, and chroma of 2 to 6 moist and 4 to 6 dry. It is extremely cobbly clay loam or extremely cobbly loam.

Kelso Series

The Kelso series consists of very deep, moderately well drained soils on high terraces and terrace escarpments. These soils formed in old alluvium. Slope is 0 to 50 percent. Elevation is 50 to 200 feet. The mean annual precipitation is 40 to 60 inches, the mean annual air temperature is about 51 degrees F, and the growing season is 220 to 240 days.

These soils are classified as fine-silty, mixed, mesic Ultic Palexeralfs.

Typical pedon of Kelso silt loam, 0 to 8 percent slopes; about 2 miles southwest of Castle Rock; 835 feet west and 300 feet south of the northeast corner of sec. 14, T. 9 N., R. 2 W.

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common fine continuous tubular pores; strongly acid; clear smooth boundary.

BA—11 to 18 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; weak coarse subangular blocky structure parting to weak fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common fine continuous tubular pores; moderately acid; gradual smooth boundary.

Bt1—18 to 25 inches; dark yellowish brown (10YR 4/4) silty clay loam, light yellowish brown (10YR 6/4) dry; weak coarse prismatic structure parting to moderate fine angular blocky; hard, friable, sticky and plastic; few discontinuous distinct brown (7.5YR 4/4) coatings on faces of peds; common fine roots; many fine continuous tubular pores; few fine faint pale brown (10YR 6/3) mottles along pores; strongly acid; clear smooth boundary.

Bt2—25 to 34 inches; yellowish brown (10YR 5/4) silty clay loam, light yellowish brown (10YR 6/4) dry; many coarse prominent pale brown (10YR 6/3) mottles, very pale brown (10YR 7/3) dry; weak coarse prismatic structure parting to moderate fine angular blocky; slightly hard, friable, slightly sticky and slightly plastic; few patchy distinct manganese or iron-manganese coatings on faces of peds; few very fine roots between peds; many fine and few medium continuous tubular pores; strongly acid; abrupt smooth boundary.

Bt/E—34 to 45 inches; 65 percent (Bt part) yellowish brown (10YR 5/4) silty clay loam, very pale brown (10YR 7/4) dry, and 35 percent (E part) grayish brown (2.5Y 5/2) silt loam, white (2.5Y 8/2) dry; many coarse prominent weak red (2.5YR 5/2) mottles; moderate fine angular blocky structure; hard, friable, sticky and plastic; few thin patchy dark brown (7.5YR 3/4) clay films on faces of peds; common fine continuous tubular pores; strongly acid; clear smooth boundary.

Bt3—45 to 60 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; many coarse prominent pinkish gray (5YR 6/2) mottles; moderate medium angular blocky structure; hard, friable, sticky and plastic; very few patchy distinct very dark gray (5Y 3/1) manganese or iron-manganese coatings on faces of peds; few fine and medium continuous tubular pores; clay films in pores; strongly acid.

Depth to the Bt/E horizon is more than 30 inches. The profile is moderately acid or strongly acid throughout.

The Ap horizon has hue of 10YR, value of 2 or 3 moist and 4 or 5 dry, and chroma of 2 or 3 moist or dry.

The BA horizon has hue of 10YR, value of 3 or 4 moist and 5 or 6 dry, and chroma of 4 to 6 moist and 2 to 4 dry.

The Bt horizon has hue of 10YR, value of 4 or 5 moist and 6 dry, and chroma of 2 to 4 moist or dry. It has distinct or prominent mottles. It is silt loam or silty clay loam.

The B part of the Bt/E horizon has hue of 5YR to 10YR value of 4 or 5 moist and 5 to 7 dry, and chroma of 4 to 6 moist or dry. It is silt loam or silty clay loam. The E part has hue of 2.5Y, value of 4 or 5 moist and 7 or 8 dry, and chroma of 2 moist or dry.

In some pedons the lower part of the Bt3 horizon is stratified, ranging from fine sandy loam to silty clay.

Depth to the perched high water table is 2 to 3 feet in December through March.

Kosmos Series

The Kosmos series consists of very deep, somewhat poorly drained soils on terraces. These soils formed in glaciofluvial material. Slope is 0 to 3 percent. Elevation is 300 to 400 feet. The mean annual precipitation is 50 to 60 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 220 to 240 days.

These soils are classified as fine-loamy, mixed, mesic Typic Ochraqualfs.

Typical pedon of Kosmos silt loam, 0 to 3 percent slopes; about 6.5 miles northeast of Castle Rock; 1,700 feet east and 500 feet north of the southwest corner of sec. 1, T. 10 N., R. 1 W.

Ag1—0 to 7 inches; dark gray (10YR 4/1) silt loam, gray (10YR 6/1) dry; strong fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; many fine interstitial pores; moderately acid; clear smooth boundary.

Ag2—7 to 12 inches; gray (10YR 5/1) silty clay loam, gray (10YR 6/1) dry; common fine distinct reddish brown (5YR 4/4) mottles, strong brown (7.5YR 5/6) dry; strong fine and medium subangular blocky structure; hard, friable, sticky and plastic; many fine and medium interstitial pores; moderately acid; clear smooth boundary.

Btg1—12 to 17 inches; gray (5Y 5/1) silty clay loam, gray (10YR 6/1) dry; many medium prominent reddish brown (5YR 4/4) mottles, strong brown (7.5YR 5/6) dry; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common fine and medium roots; many fine and few medium tubular pores; few faint patchy clay films in some pores; moderately acid; clear smooth boundary.

2Btg2—17 to 37 inches; gray (5Y 5/1) sandy clay loam, light gray (10YR 7/1) dry; many coarse prominent reddish brown (5YR 4/4) mottles, yellowish red (5YR 4/6) and dark red (2.5YR 4/8) dry; moderate coarse prismatic structure; hard, firm, slightly sticky and slightly plastic; few fine pores; few faint patchy clay films in pores; strongly acid; clear smooth boundary.

2Btg3—37 to 47 inches; gray (5Y 5/1) sandy clay loam, gray (10YR 6/1) dry; many medium prominent reddish brown (5YR 4/4) mottles, yellowish red (5YR 4/6) dry; moderate coarse prismatic structure and moderate medium subangular blocky; hard, firm, sticky and very plastic; few fine roots; many fine and medium tubular pores; few faint patchy clay films in some pores; moderately acid; clear smooth boundary.

2Cg1—47 to 56 inches; grayish brown (2.5Y 5/2) sandy clay loam, light gray (10YR 7/2) dry; common medium prominent reddish brown (5YR 4/4) mottles, yellowish red (5YR 4/6) dry; moderate coarse prismatic structure and moderate medium subangular blocky; hard, firm, sticky and very plastic; few fine roots; many fine and medium tubular pores; few patchy clay films in some pores; strongly acid; clear smooth boundary.

3Cg2—56 to 60 inches; grayish brown (2.5Y 5/2) coarse sandy loam, light brownish gray (10YR 6/2) dry; many medium distinct brown (7.5YR 4/4) mottles, yellowish red (5YR 5/6) dry; massive; hard, very friable, nonsticky and nonplastic; few fine roots; common fine and medium and few coarse tubular pores and many fine interstitial pores; moderately acid.

Depth to coarse sandy loam is 40 to 60 inches. The profile is moderately acid or strongly acid throughout.

The Ag horizon has value of 4 or 5 moist and chroma of 1 or 2 moist or dry. It is mottled below a depth of 7 inches. The lower part is silt loam or silty clay loam.

The Btg horizon has hue of 5Y to 10YR, value of 4 or 5 moist, and chroma of 1 or 2 moist or dry. It has distinct or prominent mottles. It is silty clay loam, clay loam, or sandy clay loam.

The 2Cg horizon is coarse sandy loam, sandy loam, or sandy clay loam.

A perched high water table is at the surface to a depth of 2 feet below the surface in November through May.

Lacamas Series

The Lacamas series consists of very deep, poorly drained soils on terraces. These soils formed in mixed alluvium derived from glacial and sedimentary sources. Slope is 0 to 6 percent. Elevation is 480 to 550 feet. The mean annual precipitation is 50 to 60 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 220 to 240 days.

These soils are classified as fine, mixed, mesic Typic Glossaqualfs.

Typical pedon of Lacamas silt loam, 0 to 6 percent slopes; about 10 miles east of Castle Rock; 150 feet west and 25 feet north of the southeast corner of sec. 26, T. 10 N., R. 1 W.

Oe—2 inches to 0; needles, leaves, and twigs in various stages of decomposition; abrupt smooth boundary.

A—0 to 4 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; moderate medium and strong fine granular structure and moderate medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; many very fine and fine pores; strongly acid; clear wavy boundary.

E—4 to 10 inches; dark gray (10YR 4/1) silt loam, light gray (10YR 6/1) dry; few fine distinct strong brown (7.5YR 5/8) mottles, strong brown (7.5YR 5/8) dry; moderate medium and strong fine subangular blocky structure; hard, friable, sticky and slightly plastic; many fine and medium roots and common coarse roots; few coarse, common medium, and many very fine tubular pores; strongly acid; abrupt wavy boundary.

Btg1—10 to 20 inches; grayish brown (2.5Y 5/2) silty clay, pale yellow (2.5Y 8/2) dry; moderate medium prismatic structure parting to angular blocky; very hard, very firm, slightly sticky and very plastic; few fine roots; many fine, common medium, and few coarse tubular pores; many thick clay films on peds and in pores; few pebbles; thin gray coatings on faces of prisms; very strongly acid; gradual wavy boundary.

Btg2—20 to 60 inches; grayish brown (2.5Y 5/2) clay, pale yellow (2.5Y 8/2) dry; moderate medium prismatic structure parting to angular blocky; very hard, very firm, slightly sticky and very plastic; few fine roots; many fine, common medium, and few coarse tubular pores; many prominent clay films on peds and in pores; few pebbles; thin gray coatings on faces of prisms; strongly acid.

The particle-size control section is 45 to 60 percent clay. The solum is 45 to 60 inches thick or more.

The A horizon has value of 2 or 3 moist and 4 to 7 dry, and it has chroma of 1 or 2 moist or dry.

The E horizon has value of 4 or 5 moist and 6 to 8 dry, and it has chroma of 1 or 2 moist or dry. It is silt loam or silty clay loam.

The Btg horizon has hue of 2.5Y or 10YR, value of 5 or 6 moist, and chroma of 0 to 2 moist or dry. It has faint to prominent mottles. It is silty clay or clay. The horizon has moderate or strong, very fine to coarse, prismatic parting to subangular or angular blocky structure. In some pedons the horizon has coatings of silt loam $^{1}/_{16}$ to $^{3}/_{16}$ inch thick.

A perched high water table is at the surface to a depth of 0.5 foot below the surface in December through April.

Lates Series

The Lates series consists of moderately deep, well drained soils on mountainslopes. These soils formed in residuum and colluvium derived from basalt. Slope is 5 to 90 percent. Elevation is 1,800 to 2,600 feet. The mean annual precipitation is 80 to 100 inches, the mean annual air temperature is about 44 degrees F, and the growing season is 150 to 180 days.

These soils are classified as medial, frigid Andic Haplumbrepts.

Typical pedon of Lates silt loam, 5 to 30 percent slopes; about 9 miles north of Stella, about 1,500 feet north and 1,000 feet east of the southwest corner of sec. 22, T. 10 N., R. 4 W.

Oe—4 inches to 0; needles, leaves, and twigs in various stages of decomposition; abrupt smooth boundary.

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) silt loam, dark yellowish brown (10YR 4/4) dry; weak medium and fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic, weakly smeary; common very fine, fine, and medium roots; many very fine and fine tubular pores; 1 to 2 percent pebble-sized basalt fragments; strongly acid; abrupt wavy boundary.

A2—3 to 12 inches; dark brown (7.5YR 3/2) silt loam, dark yellowish brown (10YR 4/4) dry; weak medium and fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic, weakly smeary; many fine and common coarse roots; common fine and medium tubular pores; 5 percent pebble-sized basalt fragments; strongly acid; abrupt wavy boundary.

Bw1—12 to 22 inches; dark yellowish brown (10YR 3/4) gravelly silt loam, dark yellowish brown (10YR 3/6) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic, weakly smeary; common very fine and fine roots; common very fine, fine, and medium tubular pores; 15 percent pebble-sized basalt fragments; moderately acid; gradual wavy boundary.

Bw2—22 to 36 inches; dark yellowish brown (10YR 3/4) gravelly silt loam, dark yellowish brown (10YR 4/4) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, nonsticky and

nonplastic, weakly smeary; common very fine and fine roots; common very fine and fine tubular pores; 20 percent pebbles; moderately acid; abrupt wavy boundary.

R—36 inches; fractured basalt.

Depth to bedrock is 20 to 40 inches. The particle-size control section averages 20 to 30 percent clay and 15 to 30 percent rock fragments.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3 moist and 3 or 4 dry, and chroma of 1 to 3 moist and 2 to 4 dry. It is strongly acid or very strongly acid.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 or 4 moist and 4 or 5 dry, and chroma of 3 to 6 moist or dry. It is gravelly silt loam or gravelly loam. It is moderately acid or strongly acid.

Lonestar Series

The Lonestar series consists of very deep and deep, well drained soils on ridgetops and mountainslopes. These soils formed in volcanic ash and pumice over colluvium derived from basic igneous rock. Slope is 5 to 90 percent. Elevation is 2,800 to 4,500 feet. The mean annual precipitation is 110 to 130 inches, the mean annual air temperature is about 39 degrees F, and the growing season is 90 to 140 days.

These soils are classified as ashy over medial Humic Cryorthods.

Typical pedon of Lonestar sandy loam, 30 to 65 percent slopes; about 7 miles north of Cougar; 2,510 feet north and 400 feet east of the southwest corner of sec. 34, T. 8 N., R. 4 E.

Oi—3 inches to 1 inch; undecomposed needles, twigs, and leaves; abrupt smooth boundary.

Oa—1 inch to 0; decomposed organic material; abrupt smooth boundary.

A—0 to 2 inches; dark gray (10YR 4/1) loamy sand (volcanic ash), gray (10YR 6/1) dry; single grain; soft, very friable, nonsticky and nonplastic, weakly smeary; many fine, medium, and coarse roots; many fine irregular pores; 10 percent pumice fragments 2 to 10 millimeters in diameter; strongly acid; abrupt wavy boundary.

Bhs1—2 to 10 inches; dark brown (10YR 3/3) sandy loam when mixed (volcanic ash and cinders), light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; many fine, medium, and coarse roots; common fine irregular pores; 10 percent pumice fragments; moderately acid; abrupt wavy boundary.

Bhs2—10 to 17 inches; dark brown (10YR 3/3) sandy loam (volcanic ash), light yellowish brown (10YR 6/4) dry; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic, weakly smeary; many fine, medium, and coarse roots; many fine irregular pores; 10 percent pumice fragments; moderately acid; abrupt smooth boundary.

C—17 to 24 inches; gray (10YR 5/1) loamy sand (volcanic ash and cinders), white (10YR 8/1) dry; many fine prominent strong brown (7.5YR 4/6 and 5/8) mottles, reddish yellow (7.5YR 7/6 and 7/8) dry; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; many fine irregular pores; 10 percent pumice fragments; moderately acid; abrupt wavy boundary.

2Bsb—24 to 30 inches; dark brown (7.5YR 3/4) sandy loam, light yellowish brown (10YR 6/4) dry; few fine faint strong brown (7.5YR 4/6) mottles, reddish yellow (7.5YR 6/6) dry; moderate medium and coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic, weakly smeary; many fine and common medium roots; common fine irregular pores; 10 percent soft pumice fragments; slightly acid; clear wavy boundary.

3C—30 to 60 inches; dark yellowish brown (10YR 4/6) sandy loam, yellow (10YR 7/6) dry; massive; slightly hard, friable, nonsticky and slightly plastic, weakly smeary; common fine roots; few fine irregular pores; 20 percent soft pumice fragments; slightly acid.

Depth to bedrock is 40 to 60 inches or more. The upper part of the particle-size control section averages 10 to 20 percent pumice fragments, and the lower part averages 0 to 15 percent rock fragments. Depth to the buried layer is 20 to 35 inches.

The A horizon is sand, loamy sand, or sandy loam.

The Bhs horizon has hue of 7.5YR or 10YR, value of 2 or 3 moist and 5 or 6 dry, and chroma of 2 to 4 moist or dry. It is not mottled, or it has few mottles that have hue of 7.5YR or 5YR and chroma of 2 to 4 moist. The horizon is 10 to 35 percent pumice fragments. It is moderately acid or slightly acid.

The C horizon has value of 3 to 5 moist and chroma of 3 or 4 moist or dry. It is 15 to 25 percent cinders. It is gravelly sandy loam, gravelly loamy sand, gravelly sand, or loamy sand. It is moderately acid or slightly acid.

The 2Bsb horizon has hue of 7.5YR or 10YR, value of 3 or 4 moist and 6 or 7 dry, and chroma of 4 to 6 moist or dry. It is loam, sandy loam, gravelly loam, or gravelly sandy loam. It is 0 to 15 percent rock fragments and 0 to 20 percent soft pumice fragments.

The 3C horizon has value of 4 to 6 moist. It is sandy loam or loam and is 0 to 15 percent rock fragments and 0 to 20 percent soft pumice fragments.

Loper Series

The Loper series consists of very deep, well drained soils on hillslopes and benches. These soils formed in colluvium derived from basalt with an admixture of volcanic ash and loess over pyroclastic breccia, tuff, and tuff breccia. Slope is 20 to 65 percent. Elevation is 700 to 1,800 feet. The mean annual precipitation is 60 to 80 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 200 to 240 days.

These soils are classified as fine, mixed, mesic Mollic Hapludalfs.

Typical pedon of Loper silt loam, 30 to 65 percent slopes; about 7 miles west of Castle Rock; 750 feet west and 1,500 feet south of the northeast corner of sec. 15, T. 9 N., R. 3 W.

Oe—3 inches to 0; needles, leaves, and twigs in various stages of decomposition; abrupt smooth boundary.

A1—0 to 4 inches; dark brown (7.5YR 3/2) and dark reddish brown (5YR 2/2) silt loam, dark reddish gray (5YR 4/2) dry; weak medium subangular blocky structure parting to moderate fine subangular blocky parting to moderate medium granular; slightly hard, very friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, and coarse roots throughout; many very fine and fine vesicular and tubular pores; 10 percent cobbles and 10 percent pebbles of igneous rock; strongly acid; clear smooth boundary.

A2—4 to 12 inches; dark brown (7.5YR 3/2) and dark reddish brown (5YR 2/2) silt loam, dark reddish gray (5YR 4/2) dry; weak medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, and coarse roots throughout; many very fine and fine vesicular and tubular pores; 10 percent cobbles and 10 percent pebbles of igneous rock; strongly acid; gradual smooth boundary.

BA—12 to 20 inches; brown (7.5YR 4/4) and dark brown (7.5YR 3/4) loam, brown (7.5YR 5/4) dry; weak medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, and coarse roots throughout; many very fine and fine vesicular and tubular pores; 5 percent cobbles and 10 percent pebbles of igneous rock; strongly acid; clear smooth boundary.

Bt1—20 to 28 inches; brown (7.5YR 4/4) and dark brown (7.5YR 3/4) loam, brown (7.5YR 5/4) dry; weak medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine and common coarse roots throughout; many very fine and fine vesicular and tubular pores; few faint clay films on faces of peds; 5 percent cobbles, 10 percent pebbles, and 20 percent soft pebbles; moderately acid; clear smooth boundary.

Bt2—28 to 44 inches; dark reddish brown (5YR 3/3) clay loam, reddish brown (5YR 5/4) dry; moderate medium subangular blocky structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; many discontinuous distinct dark reddish brown (5YR 3/3) clay films on faces of peds; many fine and common coarse roots throughout; many very fine and fine vesicular and tubular pores; 5 percent pebbles and 30 percent soft pebbles; strongly acid; clear wavy boundary.

2Bt3—44 to 60 inches; reddish brown (5YR 4/4) and dark brown (7.5YR 3/4) clay loam, yellowish red (5YR 5/6) dry; moderate medium subangular blocky structure parting to moderate fine subangular blocky; hard, firm, very sticky and very plastic; many discontinuous distinct dusky red (2.5YR 3/3) clay films on faces of peds; many fine and common coarse roots throughout; many very fine and fine vesicular and tubular pores; 5 percent pebbles and 35 percent soft pebbles; strongly acid.

The umbric epipedon is 10 to 15 inches thick. The upper 14 to 20 inches of the profile is dominantly amorphous material. The argillic horizon is 40 to 60 percent clay. The profile is moderately acid or strongly acid throughout.

The A horizon has hue of 7.5YR or 5YR, and it has value and chroma of 2 or 3 moist or dry. It is 0 to 10 percent cobbles and 0 to 10 percent pebbles.

The Bt horizon has value and chroma of 3 or 4 moist or dry. It is loam or clay loam. It is 0 to 5 percent cobbles, 5 to 10 percent pebbles, and 20 to 30 percent soft pebbles.

The 2Bt horizon has hue of 5YR or 7.5YR, value of 3 or 4 moist and 4 or 5 dry, and chroma of 3 or 4 moist and 4 to 6 dry. It is clay loam or clay. It is 0 to 5 percent pebbles and 25 to 50 percent soft pebbles.

Lytell Series

The Lytell series consists of deep, well drained soils on hillslopes and ridgetops. These soils formed in residuum and colluvium derived dominantly from siltstone and sandstone. Slope is 5 to 75 percent. Elevation is 800 to 1,800 feet. The mean annual precipitation is 75 to 110 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 200 to 240 days.

These soils are classified as medial, mesic Typic Dystrandepts.

Typical pedon of Lytell silt loam, 5 to 30 percent slopes; about 7 miles west of Ryderwood; 200 feet north and 1,600 feet west of the southeast corner of sec. 4, T. 10 N., R. 4 W.

Oe—2 inches to 1 inch; partially decomposed organic litter, including needles, leaves, twigs, cones, bark chips, and roots; abrupt smooth boundary.

Oa—1 inch to 0; decomposed organic material; abrupt wavy boundary.

A—0 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, dark brown (10YR 3/3) dry; strong fine and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic, weakly smeary; common very fine and fine roots and few medium roots; many fine pores; 20 percent subangular, pebble-sized, soft siltstone fragments; strongly acid; gradual smooth boundary.

BA—12 to 18 inches; dark brown (10YR 3/3) silty clay loam, brown (10YR 3/4) dry; moderate medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic, weakly smeary; common fine and medium roots; common fine and medium tubular pores; 30 percent subangular, pebble-sized, soft siltstone fragments; very strongly acid; clear wavy boundary.

Bw1—18 to 27 inches; brown (10YR 3/4) silty clay loam, dark yellowish brown (10YR 4/4) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common very fine and fine roots; common fine and medium pores; 35 percent angular, pebble-sized, soft siltstone fragments; very strongly acid; clear wavy boundary.

Bw2—27 to 43 inches; dark yellowish brown (10YR 3/4) silty clay loam, yellowish brown (10YR 5/4) dry; weak fine and medium subangular blocky structure; slightly hard, firm, sticky and plastic, weakly smeary; few very fine and fine roots; few very fine and fine pores; 65 percent angular, pebble- and cobble-sized, soft siltstone fragments; very strongly acid; clear wavy boundary.

BC—43 to 55 inches; dark yellowish brown (10YR 3/6) silty clay loam, yellowish brown (10YR 5/6) dry; weak fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic, weakly smeary; few very fine and fine roots; few fine pores; 85 percent angular, pebble- and cobble-sized, soft siltstone fragments; strongly acid; abrupt smooth boundary.

Cr—55 to 65 inches; fractured, highly weathered siltstone.

Depth to bedrock is 40 to 60 inches. The particle-size control section is 27 to 35 percent clay and averages about 45 percent soft siltstone fragments. The profile is strongly acid or very strongly acid throughout.

The A horizon has value of 2 or 3 moist and 3 to 5 dry, and it has chroma of 2 or 3 moist or dry. It is 10 to 20 percent soft siltstone fragments.

The Bw and BC horizons have value of 3 to 5 moist and 3 to 6 dry, and they have chroma of 3 to 7 moist or dry. They are clay loam or silty clay loam. They are 15 to 85 percent soft siltstone fragments.

Mart Series

The Mart series consists of very deep, well drained soils on hillslopes, ridgetops, and mountainslopes. These soils formed in residuum derived from andesite and volcanic breccia. Slope is 0 to 65 percent. Elevation is 500 to 1,800 feet. The mean annual precipitation is 40 to 75 inches, the mean annual air temperature is about 51 degrees F, and the growing season is 220 to 240 days.

These soils are classified as fine, mixed, mesic Pachic Ultic Argixerolls.

Typical pedon of Mart silt loam, 8 to 20 percent slopes; about 5 miles north of Woodland; 1,900 feet west and 200 feet north of the southeast corner of sec. 22, T. 6 N., R. 1 W.

A1—0 to 4 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many fine interstitial and tubular pores; strongly acid; abrupt smooth boundary.

A2—4 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic;

many very fine and fine roots; many fine interstitial and tubular pores; strongly acid; clear smooth boundary.

BAt—11 to 20 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few faint patchy very dark grayish brown (10YR 3/2) clay films on faces of peds; many very fine and common fine roots; few fine interstitial and tubular pores; moderately acid; clear smooth boundary.

Bt1—20 to 26 inches; dark brown (10YR 3/3) silty clay loam, brown (10YR 5/3) dry; strong medium subangular blocky structure; hard, firm, sticky and plastic; many discontinuous distinct dark brown (10YR 3/3) clay films on faces of peds; many very fine and common fine roots; few fine interstitial and tubular pores; moderately acid; clear smooth boundary.

Bt2—26 to 40 inches; dark yellowish brown (10YR 4/4) silty clay loam, brown (10YR 5/3) dry; moderate medium prismatic structure parting to strong medium subangular blocky; hard, firm, sticky and plastic; brown and dark brown (7.5YR 4/4) clay films on faces of peds; few very fine and fine roots; few fine interstitial and tubular pores; 10 percent pebbles of saprolite; moderately acid; clear smooth boundary.

BCt1—40 to 58 inches; dark yellowish brown (10YR 4/4) silty clay loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; hard, firm, sticky and plastic; many discontinuous distinct brown and dark brown (7.5YR 4/4) clay films on faces of peds; moderately acid; abrupt wavy boundary.

BCt2—58 to 72 inches; very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), and brown (7.5YR 4/4) silt loam, yellowish brown (10YR 5/4) dry; moderate coarse subangular blocky structure; hard, firm, sticky and plastic; many discontinuous distinct brown (7.5YR 4/4) clay films on faces of peds; moderately acid.

The mollic epipedon is 20 to 30 inches thick, and it includes part of the argillic horizon. The profile is strongly acid or moderately acid.

The A horizon has value of 2 or 3 moist and 3 to 5 dry, and it has chroma of 2 or 3 moist or dry.

The Bt horizon has hue of 10YR or 7.5YR, value of 3 or 4 moist and 4 or 5 dry, and chroma of 2 to 4 moist or dry.

The BCt horizon has color similar to that of the Bt horizon. The BCt horizon is silty clay loam or silt loam.

Maytown Series

The Maytown series consists of very deep, moderately well drained soils on flood plains. These soils formed in alluvium. Slope is 0 to 3 percent. Elevation is 10 to 25 feet. The mean annual precipitation is 40 to 55 inches, the mean annual air temperature is about 51 degrees F, and the growing season is 200 to 240 days.

These soils are classified as fine-silty, mixed, mesic Fluventic Haploxerolls.

Typical pedon of Maytown silt loam, 0 to 3 percent slopes; about 2 miles west of Woodland; 300 feet south and 2,100 feet west of the northeast corner of sec. 14, T. 5 N., R. 1 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate very fine granular structure; hard, very friable, slightly sticky and slightly plastic; many fine roots; many very fine tubular pores; moderately acid; gradual wavy boundary.

A—10 to 18 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak very fine granular structure; hard, very friable, slightly sticky and slightly plastic; many fine roots; common very fine and fine tubular pores; moderately acid; abrupt smooth boundary.

Bw1—18 to 28 inches; light yellowish brown (10YR 6/4) silt loam, light gray (10YR 7/2) dry; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common very fine and fine tubular pores; moderately acid; abrupt smooth boundary.

Bw2—28 to 36 inches; light brownish gray (10YR 6/2) silty clay loam, pale yellow (10YR 8/2) dry; weak very thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; common very fine tubular pores; moderately acid; gradual wavy boundary.

Bw3—36 to 60 inches; olive brown (2.5Y 4/4) silt loam, light yellowish brown (2.5Y 6/4) dry; common large prominent yellowish red (5YR 4/6) mottles; strong fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; common fine tubular pores; moderately acid.

The mollic epipedon is 10 to 20 inches thick. Faint or distinct mottles are below a depth of 30 inches. Base saturation of the upper 30 inches of the profile is 50 to 75 percent.

The A horizon has hue of 10YR or 7.5YR, value of 4

or 5 dry, and chroma of 1 to 3 moist or dry. It is strongly acid or moderately acid.

The Bw horizon has hue of 10YR or 2.5Y, value of 4 to 6 moist and 6 or 7 dry, and chroma of 2 to 4 moist or dry. It dominantly is silt loam or silty clay loam, but it has thin discontinuous layers of fine sandy loam and silty clay in some places. The horizon is very strongly acid to moderately acid.

An apparent high water table is at a depth of 2.5 to 3.5 feet in November through April. The Maytown soils are subject to occasional, brief periods of flooding in November through March.

Melbourne Series

The Melbourne series consists of very deep, well drained soils on hillslopes and ridgetops. These soils formed in residuum derived from siltstone. Slope is 8 to 30 percent. Elevation is 200 to 800 feet. The mean annual precipitation is 50 to 60 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 175 to 240 days.

These soils are classified as fine, mixed, mesic Ultic Palexeralfs.

Typical pedon of Melbourne loam, 20 to 30 percent slopes; about 5 miles north of Castle Rock; 1,600 feet west and 650 feet north of the southeast corner of sec. 14, T. 10 N., R. 2 W.

A—0 to 10 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 5/3) dry; strong very fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and medium roots; many very fine interstitial pores; moderately acid; clear wavy boundary.

AB—10 to 18 inches; dark brown (10YR 4/2) silty clay loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common very fine, fine, and medium roots; common very fine and fine tubular pores; strongly acid; gradual smooth boundary.

Bt1—18 to 35 inches; brown (10YR 4/3) silty clay, yellowish brown (10YR 5/4) dry; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots; common very fine tubular pores; few faint and distinct clay films on faces of peds and lining pores; strongly acid; gradual smooth boundary.

Bt2—35 to 60 inches; dark yellowish brown (10YR 4/4) silty clay, yellowish brown (10YR 5/4) dry; moderate fine subangular blocky structure; very hard, firm, sticky and plastic; few very fine and fine roots; common very fine tubular pores; common faint and distinct clay films on faces of peds and lining pores; strongly acid.

The particle-size control section is 35 to 60 percent clay. The profile has hue of 10YR or 7.5YR throughout.

The A horizon has value of 2 or 3 moist and 5 or 6 dry, and it has chroma of 2 to 4 moist or dry. It is slightly acid or moderately acid.

The Bt horizon has value of 4 or 5 moist and 5 or 6 dry, and it has chroma of 3 or 4 moist and 3 to 8 dry. It is clay loam, silty clay loam, silty clay, or clay. It is moderately acid or strongly acid.

Minniece Series

The Minniece series consists of very deep, somewhat poorly drained soils on terraces. These soils formed in alluvium. Slope is 0 to 8 percent. Elevation is 60 to 400 feet. The mean annual precipitation is 50 to 60 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 200 to 240 days.

These soils are classified as fine, mixed, mesic Typic Umbraqualfs.

Typical pedon of Minniece silt loam, 0 to 8 percent slopes; about 7 miles north of Castle Rock; 875 feet south and 670 feet west of the northeast corner of sec. 3, T. 10 N., R. 2 W.

A1—0 to 2 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; moderate and strong medium granular structure; slightly hard, friable, sticky and slightly plastic; many fine, medium, and coarse roots; few fine shotlike concretions; few pebbles $^1/_2$ inch to $1^1/_4$ inches in diameter; strongly acid; abrupt wavy boundary.

A2—2 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium subangular blocky structure; hard, friable, sticky and slightly plastic; many fine, medium, and coarse roots; common medium and few coarse tubular pores; few pebbles $^1/_2$ inch to $1^1/_4$ inches in diameter; strongly acid; abrupt wavy boundary.

2Btg1—12 to 20 inches; grayish brown (2.5Y 5/2) silty clay, light gray (2.5Y 7/2) dry; moderate fine and medium subangular blocky structure; hard, very firm, very sticky and plastic; common fine and medium roots; many very fine and few medium tubular pores; faint patchy clay films in pores and on faces of peds; many medium distinct strong brown (7.5YR 5/6) and yellowish red (5YR 5/6) mottles; common medium black manganese dioxide concretions and stains; few pebbles $^1/_2$ inch

to $1^1/_4$ inches in diameter; strongly acid; clear wavy boundary.

2Btg2—20 to 30 inches; grayish brown (10YR 5/2) silty clay, light gray (10YR 7/2) dry; moderate medium prismatic structure and moderate fine subangular blocky; very hard, very firm, very sticky and plastic; common fine roots; few very fine, common medium, and few coarse tubular pores; prominent continuous clay films in pores and on faces of peds; many medium distinct yellowish red (5YR 5/8) mottles; common medium black manganese dioxide concretions and stains; few pebbles $^1/_2$ inch to $1^1/_4$ inches in diameter; strongly acid; clear wavy boundary.

2Btg3—30 to 42 inches; grayish brown (10YR 5/2) silty clay, light gray (10YR 7/1) dry; moderate medium prismatic structure and moderate fine and medium subangular blocky; very hard, firm, very sticky and plastic; common fine roots; prominent continuous clay films in pores and on faces of peds; common very fine and few medium and coarse tubular pores; many medium distinct grayish brown (2.5Y 5/2) and strong brown (7.5YR 5/6) mottles; few fine black manganese dioxide concretions and stains; few pebbles $^1/_2$ inch to $1^1/_4$ inches in diameter; strongly acid; abrupt wavy boundary.

2Btg4—42 to 60 inches; dark grayish brown (10YR 4/2) silty clay loam, grayish brown (10YR 5/2) dry; moderate coarse prismatic structure and moderate medium subangular blocky; very hard, friable, sticky and plastic; few fine roots; many fine and few medium and very coarse tubular pores; prominent continuous dark grayish brown (10YR 4/2) clay films, brown (7.5YR 4/2) dry; common fine prominent yellowish red (5YR 4/6) and light brownish gray (2.5YR 6/2) mottles; trace of black manganese dioxide stains; strongly acid.

The umbric epipedon is 10 to 15 inches thick. The particle-size control section averages less than 10 percent rock fragments. The profile is moderately acid or strongly acid throughout.

The A horizon has value of 2 or 3 moist and 4 or 5 dry, and it has chroma of 2 moist or dry.

The 2Btg horizon has hue of 10YR or 2.5Y, value of 4 or 5 moist and 5 to 7 dry, and chroma of 1 or 2 moist or dry. It has mottles that have hue of 2.5YR to 2.5Y, value of 4 or 5 moist, and chroma of 2 to 8 moist. It is silty clay loam, clay loam, silty clay, or clay. It has prismatic and subangular blocky structure.

A perched high water table is at the surface to a depth of 2 feet below the surface in November through May.

Mountsolo Series

The Mountsolo series consists of soils that are shallow to dense material and are somewhat poorly drained. These soils are on low terraces. They formed in recent volcanic gravelly mudflow. Slope is 0 to 1 percent. Elevation is 400 to 1,200 feet. The mean annual precipitation is 60 to 80 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 200 to 240 days.

These soils are classified as sandy, mixed, mesic Aquic Xerorthents.

Typical pedon of Mountsolo gravelly sand, 0 to 1 percent slopes; about 1 mile east of Toutle; 1,500 feet south and 1,450 feet east of the northwest corner of sec. 29, T. 10 N., R. 1 E.

C—0 to 12 inches; dark gray (10YR 4/1) gravelly sand, gray (10YR 6/1) dry; single grain; loose, nonsticky and nonplastic; 25 percent pebbles; slightly acid; abrupt smooth boundary.

Cd1—12 to 48 inches; dark gray (10YR 4/1) dense glacial till that breaks to gravelly loamy sand, light gray (10YR 7/1) dry; massive (compact); hard, very firm, nonsticky and nonplastic; 30 percent pebbles; slightly acid; diffuse wavy boundary.

Cd2—48 to 60 inches; dark gray (10YR 4/1) dense glacial till that breaks to very gravelly loamy sand, light gray (10YR 7/1) dry; massive (compact); slightly hard, very firm, nonsticky and nonplastic; 45 percent pebbles; neutral.

Depth to dense glacial till is 10 to 20 inches. The particle-size control section averages 25 to 35 percent rock fragments. The profile is moderately acid to neutral throughout.

The C horizon has hue of 10YR, or it is neutral in hue. It has value of 3 to 5 moist and 6 or 7 dry and chroma of 0 to 2 moist or dry. It is gravelly sand to very gravelly sandy loam.

The Cd1 horizon has value of 3 or 4 moist and 6 or 7 dry and chroma of 0 to 2 moist or dry. It is dense glacial till that breaks to gravelly sand or gravelly loamy sand.

The Cd2 horizon has value of 4 or 5 moist and 6 or 7 dry and chroma of 1 or 2 moist or dry. It is dense glacial till that breaks to very gravelly loamy sand, gravelly loamy sand, or gravelly sand.

A perched high water table is at the surface to a depth of 1.5 feet below the surface in November through April. The Mountsolo soils are subject to occasional, brief periods of flooding in November through April.

Mulholland Series

The Mulholland series consists of very deep, well drained soils on benches, toeslopes, mountainslopes, and broad ridgetops. These soils formed in residuum and colluvium derived from tuff and tuffaceous breccia with a mantle of volcanic ash and loess. Slope is 5 to 30 percent. Elevation is 500 to 1,800 feet. The mean annual precipitation is 70 to 90 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 175 to 200 days.

These soils are classified as fine, montmorillonitic, mesic Typic Argiudolls.

Typical pedon of Mulholland silt loam, 5 to 30 percent slopes; about 16 miles east of Kelso; 2,050 feet north and 2,240 feet east of the southwest corner of sec. 29, T. 8 N., R. 2 E.

Oe—1.5 inches to 0; loose, partially decomposed organic litter, including needles, leaves, twigs, bark chips, cones, and roots; abrupt smooth boundary.

A1—0 to 5 inches; very dark brown (7.5YR 2/2) silt loam, dark brown (7.5YR 3/2) dry; weak fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic, weakly smeary; many very fine and fine roots, common medium roots, and few coarse roots; many fine pores; 10 percent shotlike aggregates 2 to 5 millimeters in diameter; moderately acid; clear wavy boundary.

A2—5 to 12 inches; dark brown (10YR 3/3) silt loam, yellowish brown (10YR 5/4) dry; moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine and fine roots, common medium roots, and few coarse roots; many fine pores; 10 percent shotlike aggregates 2 to 5 millimeters in diameter; moderately acid; clear wavy boundary.

Bt1—12 to 36 inches; yellowish brown (10YR 5/6) silty clay loam, yellow (10YR 7/6) dry; moderate medium subangular blocky structure parting to very fine and fine subangular blocky; slightly hard, firm, sticky and plastic; few faint patchy clay films on faces of peds; many very fine roots, common fine roots, and few medium and coarse roots; many fine pores; strongly acid; gradual wavy boundary.

Bt2—36 to 52 inches; dark yellowish brown (10YR 4/4) silty clay loam, light yellowish brown (10YR 6/4) dry; moderate medium and coarse subangular blocky structure; slightly hard, firm, sticky and slightly plastic; few faint patchy clay films on faces of peds; common very fine and fine roots and few medium roots; many fine pores; strongly acid; clear wavy boundary.

C—52 to 60 inches; dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) silt loam, light yellowish brown (10YR 6/4) and yellow (10YR 7/6) dry; light gray (10YR 7/2), very pale brown (10YR 7/3), and yellow (10YR 7/6) highly weathered phenocrysts, very pale brown (10YR 8/2 and 10YR 8/3) and yellow (10YR 8/6) dry; massive; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few roots; few pores; strongly acid.

The mollic epipedon is 10 to 18 inches thick. The particle-size control section averages 15 to 40 percent material that is coarser than very fine sand, including 0 to 5 percent rock fragments. Based on the apparent field texture, the particle-size control section is 18 to 35 percent clay. Based on 15-bar water content, the content of clay is more than 60 percent.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 moist and 3 to 5 dry, and chroma of 2 or 3 moist and 2 to 4 dry. It is moderately acid or strongly acid.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5 moist and 5 to 7 dry, and chroma of 4 to 6 moist or dry. The apparent field texture is silt loam, silty clay loam, or clay loam. Based on 15-bar water content, the estimated content of clay is 40 to 60 percent. The horizon is strongly acid or very strongly acid.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5 moist and 5 to 8 dry, and chroma of 3 to 8 moist or dry. Color of the highly weathered tuff varies greatly from pedon to pedon. Some pedons are multicolored. The apparent field texture is silt loam, silty clay loam, or clay loam. The horizon is strongly acid or very strongly acid.

Murnen Series

The Murnen series consists of very deep, well drained soils on ridgetops and mountain benches. These soils formed in residuum derived dominantly from saprolitic basalt and volcanic breccia with an admixture of volcanic ash and loess. Slope is 5 to 30 percent. Elevation is 1,800 to 2,500 feet. The mean annual precipitation is 80 to 110 inches, the mean annual air temperature is about 44 degrees F, and the growing season is 150 to 180 days.

These soils are classified as medial, frigid Andic Haplumbrepts.

Typical pedon of Murnen silt loam, 5 to 30 percent slopes; about 9 miles northwest of Stella; 850 feet west and 2,000 feet south of the northeast corner of sec. 34, T. 10 N., R. 4 W.

Oe—2 inches to 0; partially decomposed organic litter, including needles, leaves, twigs, bark chips, and roots; abrupt smooth boundary.

A1—0 to 13 inches; very dark brown (7.5YR 2/2) silt loam, dark reddish brown (5YR 3/3) dry; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 5 percent basalt pebbles; strongly acid; clear wavy boundary.

A2—13 to 23 inches; dark brown (7.5YR 3/2) silt loam, dark brown (7.5YR 4/3) dry; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 5 percent basalt pebbles; strongly acid; clear wavy boundary.

Bw1—23 to 34 inches; dark yellowish brown (10YR 3/4) silt loam, light yellowish brown (10YR 6/4) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common fine, medium, and coarse roots; common fine pores; strongly acid; clear wavy boundary.

Bw2—34 to 60 inches; dark yellowish brown (10YR 4/4) silt loam, very pale brown (10YR 7/4) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few fine roots and common medium and coarse roots; common fine pores; 2 percent basalt pebbles; strongly acid.

The umbric epipedon 10 to 25 inches thick. The particle-size control section averages 0 to 15 percent rock fragments and 18 to 27 percent clay. The profile is strongly acid or very strongly acid throughout.

The A horizon has hue of 5YR to 10YR, value of 2 or 3 moist and 3 or 4 dry, and chroma of 2 or 3 moist and 2 to 4 dry. It is 0 to 10 percent pebbles.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 5 moist and 5 to 7 dry, and chroma of 4 to 6 moist or dry. It is 0 to 15 percent pebbles.

Natal Series

The Natal series consists of very deep, poorly drained soils on concave terraces. These soils formed in old alluvium derived dominantly from basaltic and andesitic rock. Slope is 0 to 4 percent. Elevation is 300 to 600 feet. The mean annual precipitation is 45 to 65 inches, the mean annual air temperature is about 51 degrees F, and the growing season is 200 to 220 days.

These soils are classified as fine, mixed, mesic Umbric Ochraqualfs.

Typical pedon of Natal silty clay loam, 0 to 4 percent slopes; about 13 miles east of Castle Rock; 320 feet north and 600 feet east of the southwest corner of sec. 32, T. 10 N., R. 1 E.

Oe—2 inches to 0; needles, leaves, and twigs in various stages of decomposition; abrupt smooth boundary.

A1—0 to 5 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; common fine faint reddish brown (5YR 5/4) mottles, yellowish red (5YR 5/6) dry; strong fine subangular blocky structure; hard, firm, sticky and slightly plastic; many fine and medium roots; many very fine and fine pores; a few dark manganese specks; strongly acid; clear smooth boundary.

A2—5 to 9 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; common fine faint dark reddish brown (5YR 3/4) mottles, yellowish red (5YR 5/6) dry; thin gray sandy coatings on faces of peds; weak medium prismatic structure and strong fine subangular blocky; hard, firm, sticky and plastic; many fine and medium roots; many manganese specks; common fine tubular pores; strongly acid; clear smooth boundary.

Btg1—9 to 23 inches; dark grayish brown (10YR 4/2) clay, dark gray (10YR 4/1) dry; few medium distinct reddish brown (5YR 4/4) mottles, yellowish red (5YR 4/6) dry; strong coarse prismatic structure and moderate medium angular blocky; very hard, extremely firm, sticky and very plastic; many very fine and fine roots and few medium roots; about 5 percent pebbles 2 to 5 millimeters in diameter; many fine and few coarse tubular pores; faint continuous clay films on vertical faces of prisms and thick continuous clay films and slickensides on top and bottom of coarse prisms; strongly acid; gradual smooth boundary.

Btg2—23 to 60 inches; dark grayish brown (10YR 4/2) clay, dark gray (10YR 4/1) dry; many medium distinct reddish brown (5YR 4/4) mottles, yellowish red (5YR 5/6) dry; strong coarse prismatic structure and moderate fine angular blocky; very hard, extremely firm, sticky and very plastic; few fine and medium roots to a depth of 24 inches and very few very fine roots between depths of 24 and 30 inches; 5 percent gravel; many fine and few medium tubular pores to a depth of 30 inches and common very fine tubular pores below; faint continuous clay films on vertical faces of prisms and thick continuous clay films and slickensides on top and bottom of coarse prisms; neutral.

The particle-size control section is 40 to 60 percent

clay. The solum is more than 60 inches thick. The profile is 0 to 5 percent rock fragments.

The A horizon has hue of 10YR to 5Y, value of 2 or 3 moist and 3 to 5 dry, and chroma of 1 or 2 moist or dry.

The Btg horizon has value of 3 or 4 moist and 4 to 6 dry, and it has chroma of 1 or 2 moist or dry. The horizon is 50 to 60 percent clay. It is clay or silty clay. It is strongly acid to neutral.

An apparent high water table is at the surface to a depth of 1 foot below the surface in December through April.

Newaukum Series

The Newaukum series consists of deep and very deep, well drained soils on mountainslopes and hillslopes. These soils formed in colluvium and glaciofluvial deposits derived dominantly from volcanic ash, till, and andesite with an admixture of volcanic ash. Slope is 5 to 90 percent. Elevation is 300 to 1,800 feet. The mean annual precipitation is 60 to 75 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 160 to 200 days.

These soils are classified as medial, mesic Typic Dystrandepts.

Typical pedon on Newaukum cobbly silt loam, 5 to 30 percent slopes; about 6 miles northwest of Ariel; 150 feet north and 500 feet west of the southeast corner of sec. 17, T. 6 N., R. 3 E.

Oe—3 inches to 0; partially decomposed organic litter, including needles, leaves, twigs, bark chips, and cones; abrupt smooth boundary.

A—0 to 8 inches; dark brown (10YR 3/3) cobbly silt loam, brown (10YR 4/3) dry; moderate very fine and fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many very fine interstitial pores; 20 percent rounded and subangular pebbles and 15 percent rounded cobbles; moderately acid; gradual wavy boundary.

Bw1—8 to 19 inches; dark brown (7.5YR 3/3) gravelly silt loam, yellowish brown (10YR 5/4) dry; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine tubular pores; 25 percent rounded and subangular pebbles and few cobbles; moderately acid; gradual wavy boundary.

Bw2—19 to 30 inches; dark brown (7.5YR 3/4) gravelly loam, dark yellowish brown (10YR 4/6) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common fine roots and many medium and coarse roots; common fine tubular pores; 25 percent rounded and subangular pebbles and few cobbles; moderately acid; gradual smooth boundary.

Bw3—30 to 41 inches; dark yellowish brown (10YR 4/6) gravelly loam, brownish yellow (10YR 6/6) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common fine, medium, and coarse roots; few fine tubular pores; 30 percent rounded and subangular pebbles; neutral; clear wavy boundary.

BC—41 to 60 inches; strong brown (7.5YR 4/6) gravelly silt loam, reddish yellow (7.5YR 6/6) dry; moderate coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few fine roots and common medium and coarse roots; few fine tubular pores; 20 percent rounded and subangular pebbles and 10 percent cobbles; slightly acid.

Depth to bedrock is 40 to 60 inches or more. The profile has hue of 7.5YR or 10YR throughout. The particle-size control section 15 to 25 percent pebbles and 0 to 5 percent cobbles.

The A horizon has value of 2 or 3 moist and 4 or 5 dry, and it has chroma of 2 or 3 moist or dry. The horizon is 15 to 25 percent pebbles and 0 to 5 percent cobbles. It is 0 to 20 percent rounded shotlike aggregates. It is slightly acid or moderately acid.

The Bw horizon has value of 3 or 4 moist and 4 to 6 dry, and it has chroma of 3 to 6 moist or dry. The horizon is gravelly silt loam or gravelly loam. It is 15 to 25 percent pebbles and 0 to 10 percent cobbles. It is 0 to 10 percent soft pumice fragments. The horizon is moderately acid to neutral.

The BC horizon has value of 4 or 5 moist and 5 to 7 dry, and it has chroma of 4 to 6 moist or dry. The horizon is gravelly silt loam or gravelly loam. It is 15 to 20 percent pebbles and 0 to 10 percent cobbles. It is 0 to 10 percent soft pumice fragments. The horizon is moderately acid to neutral.

Newberg Series

The Newberg series consists of very deep, well drained soils on flood plains. These soils formed in mixed alluvium. Slope is 0 to 3 percent. Elevation is 10 to 50 feet. The mean annual precipitation is 40 to 50 inches, the mean annual air temperature is about 52 degrees F, and the growing season is 200 to 220 days.

These soils are classified as coarse-loamy, mixed, mesic Fluventic Haploxerolls.

Typical pedon of Newberg fine sandy loam, 0 to 3 percent slopes; about 3 miles southwest of Woodland; 2,100 feet north and 3,100 feet west of the southeast corner of sec. 35, T. 5 N., R 1 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) fine sandy loam, brown (10YR 5/3) dry; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine interstitial pores; moderately acid; gradual smooth boundary.

AC1—10 to 24 inches; brown (10YR 4/3) fine sandy loam, brown (10YR 5/3) dry; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine tubular pores and many very fine interstitial pores; slightly acid; gradual smooth boundary.

AC2—24 to 28 inches; very dark grayish brown (10YR 3/2) very fine sandy loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores and many very fine interstitial pores; neutral; abrupt smooth boundary.

C2—28 to 60 inches; dark brown (10YR 3/3) loamy fine sand, brown (10YR 5/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; neutral.

The particle-size control section is loamy very fine sand or fine sandy loam, and it does not have contrasting texture. It is 5 to 10 percent clay.

The Ap horizon has value of 2 or 3 moist and 4 or 5 dry, and it has chroma of 2 or 3 moist and 3 or 4 dry. It is slightly acid or moderately acid.

The AC horizon has value of 3 or 4 moist and 5 or 6 dry, and it has chroma of 2 or 3 moist and 3 or 4 dry. It is very fine sandy loam, sandy loam, or fine sandy loam. The horizon is structureless, or it has weak subangular blocky structure. It is moderately acid to neutral.

The C horizon has value of 3 or 4 moist and 5 or 6 dry, and it has chroma of 2 to 4 moist or dry. It is fine sandy loam, loamy very fine sand, or loamy fine sand. Some pedons have lenses of silt loam that are 1 to 4 inches thick.

The Newberg soils are subject to occasional, brief periods of flooding in December through March.

Olequa Series

The Olequa series consists of very deep, well drained soils on high terraces, hillslopes, plains, and terrace escarpments. These soils formed in old alluvium of mixed origin. Slope is 0 to 65 percent. Elevation is 40 to 300 feet. The mean annual precipitation is 40 to 60 inches, the mean annual air temperature is about 51 degrees F, and the growing season is 175 to 240 days.

These soils are classified as fine-silty, mixed, mesic Xeric Palehumults.

Typical pedon of Olequa silt loam, 0 to 8 percent slopes; about 5 miles east of Ryderwood; 900 feet north and 1,450 feet east of the southwest corner of sec. 4, T. 10 N., R. 2 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine tubular pores; neutral; clear wavy boundary.

A—8 to 13 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine tubular pores; 5 percent shotlike aggregates 1 to 3 millimeters in diameter; slightly acid; clear wavy boundary.

BA—13 to 20 inches; dark brown (7.5YR 3/4) silt loam, pale brown (10YR 6/3) dry; strong fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine tubular pores; 2 percent shotlike aggregates 1 to 3 millimeters in diameter; moderately acid; clear wavy boundary.

Bt1—20 to 50 inches; dark yellowish brown (10YR 4/4) silty clay loam, light yellowish brown (10YR 6/4) dry; moderate medium angular blocky structure; hard, firm, sticky and plastic; few very fine roots; few fine tubular pores; common faint clay films on faces of peds and lining pores; moderately acid; gradual wavy boundary.

Bt2—50 to 60 inches; brown (10YR 4/3) silty clay loam, pale brown (10YR 6/3) dry; common medium prominent dark brown (7.5YR 4/4) mottles, strong brown (7.5YR 5/6) dry; massive; hard, firm, slightly sticky and slightly plastic; few fine pores; many faint clay films lining pores and common faint clay films on some faces of peds; moderately acid.

The umbric epipedon is 10 to 15 inches thick. The

particle-size control section is 20 to 35 percent clay.

The A horizon has value of 2 or 3 moist and 4 or 5 dry, and it has chroma of 1 to 3 moist or dry. It is neutral or slightly acid.

The BA and Bt horizons have hue of 7.5YR or 10YR, value of 3 or 4 moist and 6 or 7 dry, and chroma of 3 or 4 moist or dry. It is silt loam or silty clay loam. It is moderately acid to very strongly acid.

Olympic Series

The Olympic series consists of deep and very deep, well drained soils on benches, terraces, hillslopes, and mountainslopes. These soils formed in residuum and colluvium derived from basalt and tuff. Slope is 2 to 65 percent. Elevation is 200 to 1,800 feet. The mean annual precipitation is 40 to 70 inches, the mean annual air temperature is about 51 degrees F, and the growing season is 175 to 240 days.

These soils are classified as clayey, mixed, mesic Xeric Palehumults.

Typical pedon of Olympic silt loam, 8 to 20 percent slopes; about 8 miles south of Toutle; 2,450 feet north and 1,200 feet east of the southwest corner of sec. 33, T. 9 N., R. 1 E.

Oe—2 inches to 0; accumulation of needles, moss, rotted wood, and twigs; many medium and coarse roots; abrupt smooth boundary.

A—0 to 4 inches; dark reddish brown (5YR 3/3) silt loam, reddish brown (5YR 4/4) dry; moderate very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; many very fine interstitial pores; 20 percent shotlike aggregates; moderately acid; clear wavy boundary.

AB—4 to 14 inches; dark reddish brown (5YR 3/3) silt loam, reddish brown (5YR 5/4) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; many very fine interstitial pores; 5 percent shotlike aggregates; moderately acid; clear wavy boundary.

Bt1—14 to 18 inches; dark reddish brown (5YR 3/4) silty clay loam, reddish brown (5YR 5/4) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; many very fine interstitial and tubular pores; common faint clay films on faces of peds; moderately acid; clear wavy boundary.

Bt2—18 to 30 inches; yellowish red (5YR 4/6) silty clay loam, yellowish red (5YR 5/6) dry; moderate medium and coarse subangular blocky structure parting to moderate very fine subangular blocky; hard, firm, sticky and slightly plastic; few very fine and fine roots and common medium and coarse roots; common very fine tubular and interstitial pores; common faint clay films on faces of peds and lining pores; moderately acid; clear wavy boundary.

Bt3—30 to 38 inches; yellowish red (5YR 4/6) silty clay, yellowish red (5YR 5/8) dry; moderate medium and coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine, fine, and medium roots; many very fine and common fine tubular pores; common distinct clay films on faces of peds and lining pores; strongly acid; clear wavy boundary.

Bt4—38 to 60 inches; yellowish red (5YR 4/6) silty clay, yellowish red (5YR 4/8) dry; moderate fine and medium subangular blocky structure; very hard, firm, sticky and plastic; common very fine and fine tubular pores; many distinct clay films on faces of peds and lining pores; strongly acid.

Depth to bedrock is 40 to 60 inches or more. The profile is 7.5YR or 5YR throughout. The particle-size control section is 35 to 60 percent clay.

The A and AB horizons have value of 3 or 4 moist and 4 or 5 dry, and they have chroma of 2 or 3 moist and 2 to 4 dry. They are slightly acid or moderately acid. The AB horizon is silt loam, clay loam, or silty clay loam.

The Bt horizon has value of 3 or 4 moist and 4 to 6 dry, and it has chroma of 4 to 8 moist or dry. The horizon is clay loam, silty clay loam, silty clay, or clay. Below a depth of 40 inches, it is 0 to 75 percent rock fragments. The horizon is moderately acid to very strongly acid.

Panamaker Series

The Panamaker series consists of very deep, somewhat excessively drained soils on low terraces and flood plains. These soils formed in sandy dredge material derived from volcanic mudflow. Slope is 0 to 3 percent. Elevation is 200 to 600 feet. The mean annual precipitation is 45 to 80 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 200 to 240 days.

These soils are classified as mixed, mesic Typic Xeropsamments.

Typical pedon of Panamaker gravelly sand, 0 to 3 percent slopes; about 3 miles east of Toutle; 350 feet north and 350 feet east of southwest corner of sec. 27, T. 10 N., R. 1 E.

C1—0 to 3 inches; dark gray (10YR 4/1) gravelly sand, gray (10YR 6/1) dry; single grain; loose, nonsticky and nonplastic; 20 percent pebbles; neutral; clear wavy boundary.
C2—3 to 60 inches; dark gray (10YR 4/1) sand, gray (10YR 6/1) dry; single grain; loose, nonsticky and nonplastic; 5 percent pebbles; neutral.

The particle-size control section averages less than 15 percent rock fragments. The profile is slightly acid or neutral.

The C horizon has hue of 10YR or 2.5Y, value of 2 to 4 moist and 5 to 7 dry, and chroma of 1 or 2 moist or dry. It is fine sand to coarse sand and is 0 to 20 percent rock fragments.

The Panamaker soils are subject to rare periods of flooding or to occasional, brief periods of flooding in November through April.

Pheeney Series

The Pheeney series consists of moderately deep, well drained soils on benches, mountainslopes, and broad ridgetops. These soils formed in residuum and colluvium derived dominantly from andesite and andesitic flow breccia with an admixture of volcanic ash. Slope is 5 to 90 percent. Elevation is 1,800 to 2,800 feet. The mean annual precipitation is 60 to 85 inches, the mean annual air temperature is about 43 degrees F, and the growing season is 140 to 190 days.

These soils are classified as medial-skeletal, frigid Andic Xerumbrepts.

Typical pedon of Pheeney gravelly silt loam, 65 to 90 percent slopes; about 2 miles northwest of Ariel; 2,500 feet north and 1,150 feet east of the southwest corner of sec. 19, T. 6 N., R. 2 E.

Oe—3 inches to 0; partially decomposed organic litter, including needles, leaves, twigs, bark chips, and cones; abrupt wavy boundary.
A—0 to 7 inches; very dark brown (10YR 2/2) gravelly silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 25 percent subangular andesite pebbles and 5 percent cobbles; moderately acid; clear wavy boundary.
AB—7 to 15 inches; very dark grayish brown (10YR 3/2) gravelly silt loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, and medium roots and common coarse roots; many fine pores; 30 percent subangular andesite pebbles and 15 percent cobbles; 10 percent shotlike aggregates 2 to 10 millimeters in diameter; moderately acid; clear wavy boundary.
Bw1—15 to 24 inches: dark brown (10YR 3/3) extremely cobbly silt loam, pale brown (10YR 6/3) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common very fine, fine, medium, and coarse roots; many fine pores; 40 percent cobbles and 30 percent gravel; moderately acid; clear irregular boundary.
Bw2—24 to 36 inches; dark yellowish brown (10YR 4/4) extremely cobbly silt loam, very pale brown (10YR 7/3) dry; massive; hard, friable, slightly sticky and slightly plastic, weakly smeary; common very fine and fine roots and few medium and coarse pores; 40 percent subangular andesite pebbles and 30 percent cobbles; strongly acid; abrupt wavy boundary.
2R—36 inches; fractured andesite.

Depth to bedrock is 20 to 40 inches. The profile has hue of 7.5YR or 10YR throughout. The particle-size control section is 35 to 70 percent pebbles and cobbles.

The A and AB horizons have value of 2 or 3 moist and 3 to 5 dry, and they have chroma of 2 or 3 moist or dry. The A horizon is 15 to 25 percent pebbles and 0 to 5 percent cobbles. The AB horizon is gravelly loam, very gravelly loam, cobbly loam, or very cobbly loam. It is 15 to 40 percent pebbles and 0 to 15 percent cobbles.

The Bw horizon has value of 3 or 4 moist and 4 to 7 dry, and it has chroma of 3 or 4 moist or dry. It is very gravelly loam, very cobbly silt loam, extremely cobbly silt loam, very cobbly loam, or extremely cobbly loam. It is 10 to 45 percent pebbles and 20 to 40 percent cobbles. It is strongly acid or moderately acid.

Pilchuck Series

The Pilchuck series consists of very deep, somewhat excessively drained soils on flood plains. These soils formed in alluvium. Slope is 0 to 8 percent. Elevation is 10 to 50 feet. The mean annual precipitation is 38 to 60 inches, the mean annual air temperature is about 52 degrees F, and the growing season is 200 to 220 days.

These soils are classified as mixed, mesic Dystric Xeropsamments.

Typical pedon of Pilchuck loamy fine sand, 0 to 8 percent slopes; about 2 miles southwest of Woodland; 550 feet west and 1,550 feet north of the southeast corner of sec. 26, T. 5 N., R. 1 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loamy fine sand, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots; many fine and medium interstitial pores; moderately acid; abrupt smooth boundary.

C1—8 to 12 inches; dark grayish brown (2.5Y 4/2) loamy fine sand, grayish brown (2.5Y 5/2) dry; single grain; loose, nonsticky and nonplastic; few fine roots; moderately acid; abrupt smooth boundary.

C2—12 to 36 inches; dark brown (10YR 3/3) fine sand, grayish brown (10YR 5/2) dry; single grain; loose, nonsticky and nonplastic; few fine roots; 10 percent fine pumice fragments; slightly acid; gradual wavy boundary.

C3—36 to 60 inches; very dark grayish brown (10YR 3/2) gravelly sand, grayish brown (10YR 5/2) dry; single grain; loose, nonsticky and nonplastic; 15 percent pebbles; slightly acid.

The particle-size control section is sand, fine sand, or loamy fine sand and is 0 to 15 percent rock fragments. It is as much as 15 percent pumice fragments. The profile is moderately acid to neutral throughout.

The Ap horizon has hue of 10YR or 2.5Y, value of 2 to 5 moist and 3 to 6 dry, and chroma of 1 or 2 moist or dry. It is single grain or has weak granular structure or moderate subangular blocky structure.

The C horizon has hue of 10YR or 2.5Y, value of 2 to 5 moist or dry, and chroma of 1 or 2 moist or dry. Below a depth of 40 inches, the horizon is dominantly gravelly loamy sand or coarser textured material with lenses of fine sandy loam or very fine sandy loam 0.5 inch to 3.0 inches thick.

The Pilchuck soils are subject to rare periods of flooding.

Polepatch Series

The Polepatch series consists of very deep, somewhat excessively drained soils on alluvial fans, terraces, and terrace escarpments. These soils formed in pyroclastic flow material and lahar with a mantle of volcanic ash and pumice. Slope is 0 to 90 percent. Elevation is 2,800 to 3,800 feet. The mean annual precipitation is 115 to 125 inches, the mean annual air temperature is about 40 degrees F, and the growing season is 90 to 120 days.

These soils are classified as sandy-skeletal, mixed Typic Cryorthents.

Typical pedon of Polepatch very cobbly loamy sand, 0 to 30 percent slopes; about 8 miles northeast of Cougar; 2,310 feet west and 660 feet north of the southeast corner of sec. 23, T. 8 N., R. 4 E.

Oe—2 inches to 0; loose, partially decomposed organic litter; abrupt smooth boundary.

A—0 to 2 inches; very dark gray (10YR 3/1) very cobbly loamy sand, gray (10YR 6/1) dry; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; many fine irregular pores; 20 percent pebbles, 15 percent cobbles, and 5 percent stones; boulders cover 3 percent of the surface; moderately acid; abrupt wavy boundary.

AC—2 to 5 inches; very dark grayish brown (10YR 3/2) very cobbly loamy sand, dark grayish brown (10YR 4/2) dry; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots, common medium roots, and few coarse roots; many fine irregular pores; 30 percent pebbles and 25 percent cobbles; moderately acid; clear smooth boundary.

2C—5 to 60 inches; very dark brown (10YR 2/2) extremely cobbly sand, dark gray (10YR 4/1) dry; single grain; loose; many very fine and fine roots and few medium roots; many medium and coarse irregular pores; 30 percent pebbles, 25 percent cobbles, and 10 percent stones; neutral.

The particle-size control section averages 60 to 85 percent rock fragments and 10 to 40 percent volcanic glass.

The A and AC horizons have value of 2 or 3 moist and 4 or 6 dry, and they have chroma of 1 or 2 moist or dry. They are 20 to 35 percent pebbles, 5 to 25 percent cobbles, and 0 to 10 percent stones. Three to five percent of the surface is covered with boulders. The A and AC horizons are moderately acid or slightly acid.

The C horizon has value of 2 to 5 moist and 6 to 8 dry, and it has chroma of 1 or 2 moist or dry. It averages 30 to 40 percent pebbles, 20 to 30 percent cobbles, and 5 to 20 percent stones. It is extremely cobbly loamy sand, extremely cobbly sand, or extremely stony coarse sand. It is moderately acid to neutral.

Prather Series

The Prather series consists of very deep, moderately well drained soils on high terraces and till plains. These soils formed in glacial drift deposits. Slope is 0 to 15 percent. Elevation is 200 to 600 feet. The mean annual precipitation is 40 to 60 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 175 to 240 days.

These soils are classified as fine, mixed, mesic Aquic Palexeralfs.

Typical pedon of Prather silty clay loam, 0 to 5 percent slopes; about 4 miles northeast of Toutle; 1,250 south and 500 feet east of the northwest corner of sec. 4, T. 10 N., R. 1 E.

Oe—2 inches to 0; partially decomposed organic litter, including needles, leaves, and twigs; abrupt smooth boundary.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) silty clay loam, brown (10YR 5/3) dry; moderate very fine and fine subangular blocky structure; hard, friable, slightly sticky and plastic; many very fine, fine, and medium roots; few very fine and fine tubular pores and many very fine interstitial pores; moderately acid; clear smooth boundary.

AB—6 to 13 inches; dark brown (7.5YR 3/4) silty clay loam, pale brown (10YR 6/3) dry; moderate very fine, fine, and medium subangular blocky structure; hard, friable, slightly sticky and plastic; many very fine, fine, and medium roots; common very fine tubular pores and many very fine interstitial pores; moderately acid; clear smooth boundary.

Bt1—13 to 30 inches; dark brown (7.5YR 4/4) silty clay, strong brown (7.5YR 5/6) dry; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; many very fine, fine, and medium roots; common very fine tubular pores; common faint clay films on faces of peds and lining pores; strongly acid; gradual smooth boundary.

Bt2—30 to 43 inches; dark brown (7.5YR 4/4) silty clay, strong brown (7.5YR 5/6) dry, common medium faint gray (10YR 5/1) mottles, light gray (10YR 7/1) dry; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and fine roots; common very fine tubular pores; many faint clay films on faces of peds and lining pores; strongly acid; gradual smooth boundary.

Bt3—43 to 60 inches; yellowish brown (10YR 5/6) clay, strong brown (7.5YR 5/6) dry; common medium distinct gray (10YR 5/1) and reddish brown (5YR 4/4) mottles, light brownish gray (10YR 6/2) and strong brown (7.5YR 5/8) dry; moderate medium and coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; common very fine tubular pores; many faint and distinct clay films on faces of peds and lining pores; moderately acid.

Mottles are at a depth of 20 to 30 inches. The solum is more than 60 inches thick. The particle-size control section is 35 to 60 percent clay.

The A and AB horizons have hue of 10YR or 7.5YR, value of 2 or 3 moist and 5 or 6 dry, and chroma of 2 to 4 moist or dry. They are slightly acid or moderately acid.

The Bt horizon has hue of 10YR or 7.5YR, value of 3 to 5 moist and 4 or 5 dry, and chroma of 4 to 6 moist and 6 to 8 dry. It is silty clay loam, silty clay, or clay. It is moderately acid or strongly acid.

A perched high water table is at a depth of 1.5 to 3.0 feet in November through April.

Raught Series

The Raught series consists of very deep, well drained soils on hillslopes and mountainslopes. These soils formed in residuum and colluvium derived from basalt with an admixture of volcanic ash and loess in the upper part. Slope is 20 to 90 percent. Elevation is 200 to 1,500 feet. The mean annual precipitation is 50 to 70 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 200 to 240 days.

These soils are classified as clayey, oxidic, mesic Typic Palehumults.

Typical pedon of Raught silt loam, 30 to 65 percent slopes; about 5 miles west of Stella; 350 feet east and 500 feet south of the northwest corner of sec. 8, T. 8 N., R. 4 W.

Oe—3 inches to 0; partially decomposed organic litter, including needles, leaves, twigs, and bark; abrupt smooth boundary.

A—0 to 11 inches; dark reddish brown (5YR 3/2) silt loam, dark reddish gray (5YR 4/2) dry; strong fine, medium, and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic, weakly smeary; common very fine and fine roots; many very fine tubular pores; slightly acid; gradual wavy boundary.

BA—11 to 21 inches; dark reddish brown (5YR 3/4) silt loam, reddish brown (5YR 5/4) dry; strong fine, medium, and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic, weakly smeary; common fine and medium roots; common fine and medium pores; slightly acid; clear smooth boundary.

Bt1—21 to 40 inches; dark reddish brown (5YR 3/4) silty clay loam, reddish brown (5YR 5/4) dry; strong medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few coarse roots; few very fine tubular pores; few faint clay films on faces of peds; 15 percent angular pebbles; slightly acid; clear smooth boundary.

Bt2—40 to 60 inches; dark reddish brown (5YR 3/4) silty clay loam, strong brown (7.5YR 5/6) dry; strong medium, coarse, and very coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few coarse roots; few very fine tubular pores; common faint clay films on faces of peds; 15 percent angular pebbles; moderately acid.

The particle-size control section averages 5 to 15 percent rock fragments and 35 to 40 percent clay.

The A horizon has value of 2 or 3 moist and 4 or 5 dry, and it has chroma of 2 or 3 moist or dry. It is strongly acid to slightly acid.

The Bt horizon has hue of 5YR or 7.5YR, value of 3 or 4 moist, and chroma of 3 or 4 moist and 3 to 6 dry. It is silty clay loam and is 5 to 15 percent pebbles. It is very strongly acid to slightly acid.

Reichel Series

The Reichel series consists of deep, well drained soils on broad ridgetops and mountainslopes. These soils formed in residuum and colluvium derived from andesite with a mantle of volcanic ash. Slope is 5 to 65 percent. Elevation is 2,600 to 3,200 feet. The mean annual precipitation is 70 to 90 inches, the mean annual air temperature is about 41 degrees F, and the growing season is 140 to 160 days.

These soils are classified as medial Andic Cryumbrepts.

Typical pedon of Reichel silt loam, 5 to 30 percent slopes; about 8 miles east of Toutle; 2,400 feet south and 1,000 feet east of the northwest corner of sec. 28, T. 10 N., R. 2 E.

Oe—3.0 to 1.5 inches; partially decomposed organic litter, including needles, leaves, twigs, bark chips, and roots; abrupt smooth boundary.

Oa—1.5 inches to 0; decomposed organic material; abrupt smooth boundary.

A1—0 to 7 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium angular blocky structure; soft, very friable, slightly sticky and slightly plastic, weakly smeary; many very fine roots; many fine pores; 5 percent andesite pebbles 2 to 5 millimeters in diameter; moderately acid; gradual wavy boundary.

A2—7 to 19 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 4/3) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common very fine and fine roots; common fine pores; 5 percent andesite pebbles; moderately acid; clear wavy boundary.

Bw—19 to 47 inches; dark yellowish brown (10YR 4/4) gravelly loam, brown (10YR 5/3) dry; moderate fine and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic, weakly smeary; common very fine and fine roots; few fine pores; 20 percent andesite pebbles; moderately acid; clear wavy boundary.

C—47 to 53 inches; dark yellowish brown (10YR 4/4) very cobbly loam, light yellowish brown (10YR 6/4) dry; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic, weakly smeary; 20 percent andesite pebbles and 30 percent rounded andesite cobbles 3 to 4 inches in diameter; strongly acid; abrupt irregular boundary.

R—53 inches; fractured andesite.

Depth to bedrock is 40 to 60 inches. The particle-size control section is 5 to 30 percent rock fragments, most of which are pebbles. The profile is moderately acid to very strongly acid throughout. It has hue of 10YR or 7.5YR throughout.

The A horizon has value of 2 or 3 moist and 4 or 5 dry, and it has chroma of 2 or 3 moist or dry. It is 0 to 10 percent pebbles.

The Bw horizon has value of 3 or 4 moist and 4 to 6 dry, and it has chroma of 3 or 4 moist or dry. It is loam, gravelly clay loam, gravelly loam, or silty clay loam. It is 2 to 25 percent pebbles and cobbles.

The C horizon has value of 3 or 4 moist and 4 to 6 dry, and it has chroma of 3 or 4 moist or dry. It is very cobbly loam, very gravelly loam, or very gravelly clay loam. It is 35 to 55 percent pebbles and cobbles.

Rose Valley Series

The Rose Valley series consists of very deep, somewhat poorly drained soils on terraces. These soils formed in old alluvium derived from basic igneous rock. Slope is 0 to 15 percent. Elevation is 40 to 300 feet. The mean annual precipitation is 45 to 55 inches, the mean annual air temperature is about 51 degrees F, and the growing season is 220 to 240 days.

These soils are classified as fine-silty, mixed, mesic Aquic Palexeralfs.

Typical pedon of Rose Valley silt loam, 0 to 8 percent slopes; about 5 miles southeast of Kelso, in Rose Valley; 2,300 feet east and 500 feet north of the southwest corner of sec. 8, T. 7 N., R. 1 W.

Ap—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common coarse roots; few fine tubular pores; strongly acid; clear smooth boundary.

A—4 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; few fine tubular pores; very strongly acid; gradual wavy boundary.

Bt/E1—11 to 18 inches; 85 percent (Bt part) dark brown (10YR 4/3) silt loam, brown (10YR 5/3) dry, and 15 percent (E part) light gray (10YR 7/2) silt loam, white (10YR 8/2) dry; few fine faint yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; hard, friable, sticky and slightly plastic; common fine roots; few fine tubular pores; very strongly acid; gradual wavy boundary.

Bt/E2—18 to 23 inches; 70 percent (Bt part) strong brown (7.5YR 5/6) silty clay loam, reddish yellow (7.5YR 6/6) dry, and 30 percent (E part) brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; weak fine angular blocky structure; hard, firm, sticky and plastic; few fine roots; common fine continuous pores; few patchy strong brown (7.5YR 5/6) iron-manganese coatings on faces of peds; very strongly acid; gradual wavy boundary.

Bt/E3—23 to 38 inches; 70 percent (Bt part) grayish brown (10YR 5/2) silty clay loam, gray (10YR 6/2) dry, and 30 percent (E part) pale yellow (2.5Y 8/2) silt loam coatings on faces of prisms, white (2.5Y 8/1) dry; common medium distinct strong brown (7.5YR 5/6) mottles, strong brown (7.5YR 5/6) dry; weak fine angular blocky structure; hard, firm, sticky and plastic; few fine roots; few fine tubular pores; few discontinuous strong brown (7.5YR 5/6) iron-manganese coatings throughout; strongly acid; gradual wavy boundary.

Bt/E4—38 to 51 inches; 60 percent (Bt part) yellowish brown (10YR 5/4) silty clay loam, light yellowish brown (10YR 6/4) dry, 40 percent (E part) white (10YR 8/1) silt loam coatings on faces of peds, white (10YR 8/1) dry; moderate medium angular blocky structure; very hard, firm, sticky and plastic; few fine roots in cracks; few fine tubular pores; few discontinuous black (5Y 2.5/2) iron-manganese coatings throughout; moderately acid; gradual wavy boundary.

Btg1—51 to 65 inches; gray (5Y 5/1) clay, light gray (5Y 7/1) dry; many large distinct strong brown (7.5YR 5/6) mottles, reddish yellow (7.5YR 7/6) dry; strong medium angular blocky structure; very hard, firm, sticky and plastic; few fine tubular pores; common discontinuous black (5Y 2.5/2) iron-manganese coatings throughout; moderately acid; clear wavy boundary.

Btg2—65 to 75 inches; gray (5Y 5/1) clay, light gray (5Y 7/1) dry; massive; extremely hard, very firm, very sticky and very plastic; few very fine tubular pores; few patchy prominent black (5Y 2.5/2) iron-manganese coatings throughout; strongly acid.

The particle-size control section averages less than 35 percent clay.

The A horizon has value of 3 or 5 moist or dry and chroma of 2 to 4 moist or dry. It is very strongly acid to moderately acid.

The Bt part of the Bt/E horizon has hue of 7.5YR or 10YR, value of 4 or 5 moist and 5 or 6 dry, and chroma of 2 to 6 moist or dry. The E part has hue of 10YR or 2.5Y, value of 5 to 8 moist and 7 or 8 dry, and chroma of 1 to 3 moist or dry. It is silty clay loam or silt loam. It is very strongly acid to moderately acid.

The Bt horizon has hue of 10YR to 5Y, value of 4 to 6 moist and 7 or 8 dry, and chroma of 1 or 2 moist or dry. The upper part of the horizon has distinct or prominent mottles. The horizon is strongly acid or moderately acid. It is silty clay, clay, or silty clay loam.

A perched high water table is at a depth of 1 to 2 feet in December through April.

Salkum Series

The Salkum series consists of very deep, well drained soils on old glaciofluvial terraces and hills. These soils formed in glacial drift deposits. Slope is 2 to 30 percent. Elevation is 200 to 600 feet. The mean annual precipitation is 40 to 60 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 175 to 240 days.

These soils are classified as clayey, kaolinitic, mesic Xeric Palehumults.

Typical pedon of Salkum silt loam, 2 to 8 percent slopes; about 7 miles north of Castle Rock; 2,000 feet north and 2,250 feet west of the southeast corner of sec. 2, T. 10 N., R. 2 W.

A—0 to 5 inches; dark brown (7.5YR 3/4) silt loam, yellowish brown (10YR 5/4) dry; moderate very fine, fine, and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; common very fine tubular pores; 10 percent

shotlike aggregates; strongly acid; clear smooth boundary.

AB—5 to 12 inches; brown (7.5YR 4/4) silt loam, pale brown (10YR 6/3) dry; strong very fine, fine, and medium subangular blocky structure; hard, very friable, sticky and slightly plastic; many very fine, fine, and medium roots; common very fine tubular pores; 5 percent shotlike aggregates; strongly acid; clear smooth boundary.

Bt1—12 to 39 inches; reddish brown (5YR 4/4) silty clay, strong brown (7.5YR 5/8) dry; strong medium and coarse subangular blocky structure; hard, friable, sticky and plastic; common very fine, fine, and medium roots; many very fine tubular and interstitial pores; many distinct clay films on faces of peds and lining pores; very strongly acid; gradual smooth boundary.

Bt2—39 to 45 inches; yellowish red (5YR 4/6) silty clay, strong brown (7.5YR 5/6) dry; moderate fine, medium, and coarse subangular blocky structure; hard, friable, sticky and plastic; common very fine, fine, and medium roots; many very fine tubular and interstitial pores; many prominent clay films on faces of peds and lining pores; very strongly acid; gradual smooth boundary.

Bt3—45 to 60 inches; 60 percent reddish brown (5YR 4/4), 20 percent yellow (10YR 7/8), 10 percent yellowish red (5YR 4/6), and 10 percent white (10YR 8/1) silty clay, 70 percent yellow (10YR 8/6), 10 percent dark brown (7.5YR 3/4), 10 percent reddish yellow (7.5YR 7/8), and 10 percent pink (5YR 7/4) dry; weak fine, medium, and coarse subangular blocky structure; hard, friable, sticky and plastic; common very fine tubular pores; common distinct clay films on faces of peds and lining pores; very strongly acid.

The particle-size control section averages 40 to 55 percent clay and 0 to 10 percent pebbles.

The A horizon has hue of 10YR to 5YR, value of 2 or 3 moist and 4 or 5 dry, and chroma of 2 to 4 moist or dry. It is moderately acid or strongly acid.

The AB horizon has hue of 10YR or 7.5YR, value of 3 or 4 moist and 5 or 6 dry, and chroma of 3 or 4 moist or dry. It is silt loam or silty clay loam. It is moderately acid or strongly acid.

The Bt horizon has hue of 10YR to 5YR, value of 4 or 5 moist and 3 to 6 dry, and chroma of 4 to 6 moist or dry. It is silty clay loam, silty clay, or clay. It is moderately acid to very strongly acid.

The C horizon, where present, has hue of 10YR to 2.5YR, value of 3 to 7 moist or dry, and chroma of 1 to 8 moist or dry. It is silty clay loam, silty clay, or clay.

Sara Series

The Sara series consists of very deep, moderately well drained soils on terraces and terrace escarpments. These soils formed in old alluvium and sediment derived from tuffaceous siltstone and sandstone. Slope is 0 to 40 percent. Elevation is 250 to 450 feet. The mean annual precipitation is 45 to 60 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 175 to 200 days.

These soils are classified as fine, mixed, mesic Aquic Palexeralfs.

Typical pedon of Sara silt loam, 15 to 40 percent slopes; about 4 miles north of Toutle; 2,200 feet west and 1,950 feet north of the southeast corner of sec. 6, T. 10 N., R. 1 E.

Oe—3 inches to 0; partially decomposed organic litter, including needles, leaves, twigs, bark chips, and cones; abrupt wavy boundary.

A—0 to 11 inches; dark brown (7.5YR 3/3) silt loam, brown (7.5YR 5/4) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; moderately acid; clear smooth boundary.

Bt—11 to 22 inches; dark brown (7.5YR 3/2) silty clay loam, light yellowish brown (10YR 6/4) dry; mottles that are common medium faint strong brown (7.5YR 5/8) moist or dry; strong fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine and medium roots; common distinct clay films on faces of peds and lining pores; moderately acid; clear wavy boundary.

Bt/E1—22 to 27 inches; brown (10YR 4/3) silty clay loam, brown (10YR 5/3) dry; common medium distinct strong brown (7.5YR 5/6) mottles, reddish yellow (7.5YR 6/8) dry; gray (10YR 6/1) coatings on peds, white (10YR 8/1) dry; strong fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common distinct clay films on faces of peds and lining pores; moderately acid; clear wavy boundary.

Bt/E2—27 to 35 inches; brown (10YR 4/3) silty clay loam, pale brown (10YR 6/3) dry; common medium distinct strong brown (7.5YR 5/6) mottles, reddish yellow (7.5YR 6/6) dry; gray (10YR 6/1) coatings on peds, white (10YR 8/1) dry; moderate medium angular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; many distinct clay films on faces of peds and lining pores; moderately acid; abrupt wavy boundary.

Bt/E3—35 to 60 inches; brown (10YR 5/3) silty clay, pale brown (10YR 6/3) dry; many coarse prominent

strong brown (7.5YR 5/6) mottles, reddish yellow (7.5YR 6/8) dry; gray (10YR 6/1) coatings on peds, white (10YR 8/1) dry; weak medium angular blocky structure; very hard, firm, sticky and plastic; few fine roots; many distinct clay films on faces of peds and lining pores; moderately acid.

The particle-size control section is 27 to 40 percent clay and is more than 35 percent clay by weighted average. The profile is moderately acid or strongly acid.

The A horizon has hue of 10YR to 7.5YR, value of 2 or 3 moist and 3 to 5 dry, and chroma of 2 or 3 moist. It is silt loam or silty clay loam.

The Bt part of the Bt/E horizon has hue of 7.5YR to 10YR, value of 4 or 5 moist and 5 or 6 dry, and chroma of 2 or 3 moist or dry. It dominantly has prominent mottles, but some pedons have faint or distinct mottles. Gray coatings 1/4 to 1/2 inch thick generally follow faces of prisms. The lower part of the Bt/E horizon is silty clay loam to clay.

A perched high water table is at a depth of 1 to 2 feet in December through April.

Sarazan Series

The Sarazan series consists of deep, well drained soils on mountainslopes and broad ridgetops. These soils formed in residuum and colluvium derived from breccia with an admixture of volcanic ash and loess. Slope is 5 to 65 percent. Elevation is 1,600 to 2,800 feet. The mean annual precipitation is 80 to 100 inches, the mean annual air temperature is about 43 degrees F, and the growing season is 140 to 190 days.

These soils are classified as medial-skeletal, frigid Andic Dystrochrepts.

Typical pedon of Sarazan very gravelly silt loam, 5 to 30 percent slopes; about 13 miles southeast of Toutle; 1,600 feet north and 2,000 feet west of the southeast corner of sec. 31, T. 9 N., R. 3 E.

Oe—3 inches to 0; loose, partially decomposed organic litter, including needles, leaves, twigs, bark chips, cones, and roots; abrupt smooth boundary.

A—0 to 9 inches; dark reddish brown (5YR 3/4) very gravelly silt loam, reddish brown (5YR 5/4) dry; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 20 percent shotlike aggregates 2 to 5 millimeters in diameter; 35 percent subangular basaltic breccia pebbles and 5 percent cobbles; moderately acid; clear wavy boundary.

Bw1—9 to 18 inches; reddish brown (5YR 4/4) very gravelly silt loam, yellowish red (5YR 5/6) dry; moderate medium subangular blocky structure parting to moderate granular; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 45 percent subangular basaltic breccia pebbles and 5 percent cobbles; moderately acid; clear wavy boundary.

Bw2—18 to 31 inches; yellowish red (5YR 4/6) very gravelly silt loam, strong brown (7.5YR 5/6) dry; moderate coarse subangular blocky structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 45 percent subangular basaltic breccia pebbles and 5 percent cobbles; strongly acid; clear irregular boundary.

C—31 to 50 inches; yellowish red (5YR 4/6) extremely gravelly silt loam, strong brown (7.5YR 5/8) dry; massive; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few roots; common pores; 50 percent subangular basaltic breccia pebbles and 20 percent cobbles; strongly acid; abrupt irregular boundary.

R—50 inches; highly fractured basaltic breccia; fines in fracture planes.

Depth to bedrock is 40 to 60 inches. The rock fragments commonly are subangular basaltic breccia pebbles and cobbles that have strong brown to yellowish red weathering rinds and an unweathered black center. The particle-size control section is 35 to 55 percent rock fragments.

The A horizon has hue of 5YR or 7.5YR and value of 3 or 4 moist and 4 or 5 dry.

The Bw horizon has hue of 7.5YR, 5YR, or 2.5YR, value of 4 or 5 moist and 5 or 6 dry, and chroma of 4 to 6 moist or dry. It is very gravelly silt loam or very gravelly silty clay loam. It is 35 to 50 percent pebbles and 5 to 10 percent cobbles. It is moderately acid or strongly acid.

The C horizon has hue of 7.5YR to 2.5YR, value of 4 or 5 moist and 5 to 7 dry, and chroma of 4 to 8 moist or dry. It is extremely gravelly silt loam or extremely cobbly silty clay loam. It is 45 to 55 percent pebbles and 5 to 30 percent cobbles. It is moderately acid or strongly acid.

Sauvola Series

The Sauvola series consists of very deep, moderately well drained soils on upland terraces and hillslopes. These soils formed in residuum derived from siltstone and old alluvium. Slope is 0 to 30 percent. Elevation is 150 to 900 feet. The mean annual

precipitation is 45 to 55 inches, the mean annual air temperature is about 51 degrees F, and the growing season is 175 to 225 days.

These soils are classified as fine, mixed, mesic Ultic Palexeralfs.

Typical pedon of Sauvola loam, 8 to 15 percent slopes; about 1 mile northeast of Rose Valley; 2,100 feet south and 250 feet east of the northwest corner of sec 8, T. 7 N., R. 1 W.

Ap1—0 to 5 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak fine subangular blocky structure parting to weak medium granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; many very fine interstitial pores; moderately acid; gradual smooth boundary.

Ap2—5 to 15 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine roots; few fine continuous pores; moderately acid; gradual wavy boundary.

ABt—15 to 27 inches; brown (10YR 4/3) silt loam, brown (10YR 5/3) dry; weak coarse angular blocky structure parting to moderate fine angular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common fine continuous tubular pores; few distinct clay films on peds and lining pores; strongly acid; gradual wavy boundary.

BAt—27 to 38 inches; brown (10YR 5/3) silty clay loam, pale brown (10YR 6/3) dry, with light brownish gray (10YR 6/2) coatings, white (10YR 8/1) dry; common medium distinct strong brown (7.5YR 5/6 and 5/8) and light brown (7.5YR 6/4) mottles; moderate fine angular blocky structure; hard, friable, sticky and plastic; common fine roots between peds; common fine tubular pores; many prominent clay films on peds and lining pores; few patchy distinct black (10YR 2/1) manganese or iron-manganese coatings on peds; strongly acid; gradual wavy boundary.

Bt1—38 to 51 inches; brown (7.5YR 5/4 and 4/4) and strong brown (7.5YR 5/8) silty clay loam, reddish yellow (7.5YR 6/8) dry, with brown (10YR 4/3) coatings, light gray (10YR 7/1) dry; common fine distinct reddish brown (5YR 4/4) mottles, yellowish red (5YR 5/6) dry; strong medium angular blocky structure parting to strong fine angular blocky; hard, firm, sticky and plastic; few very fine roots between peds; few fine tubular pores; continuous prominent clay films on peds and lining pores; very strongly acid; gradual wavy boundary.

Bt2—51 to 60 inches; dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/6), light brownish gray (10YR 6/2), and strong brown (7.5YR 5/6) silty clay, yellowish brown (10YR 5/4), brownish yellow (10YR 6/6), light gray (10YR 7/2), and strong brown (7.5YR 5/6) dry; strong medium angular blocky structure; hard, firm, sticky and slightly plastic; few fine roots; few fine tubular pores; continuous prominent dark brown (7.5YR 3/4) clay films on faces of peds; few discontinuous manganese coatings; very strongly acid.

The particle-size control section is more than 35 percent clay with 0 to 10 percent pebbles and 0 to 10 percent very soft, pebble-sized siltstone fragments. Thin lenses of rounded pebbles are in some pedons.

The A horizon has value of 2 or 3 moist and 5 or 6 dry, and it has chroma of 2 or 3 moist or dry. It is slightly acid or moderately acid.

The AB and BA horizons have hue of 7.5YR and 10YR, value of 4 or 5 moist and 5 or 6 dry, and chroma of 2 or 3 moist or dry. The BA horizon has mottles that have hue of 7.5YR or 10YR, value of 5 or 6 moist or dry, and chroma of 4 to 8 moist or dry. Both the AB and BA horizons are silty clay loam, loam, or silt loam, but the BA horizon ranges to silty clay. The AB and BA horizons are very strongly acid to slightly acid.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 3 to 6 moist and 5 to 8 dry, and chroma of 2 to 6 moist or dry. It has mottles that have hue of 5YR to 10YR, value of 4 to 8 moist or dry, and chroma of 2 to 8 moist or dry. The horizon is silty clay loam, silty clay, or clay. It is moderately acid to very strongly acid.

A perched high water table is at a depth of 1.5 to 3.5 feet in December through March.

Schneider Series

The Schneider series consists of deep, well drained soils on hillslopes and mountainslopes. These soils formed in residuum and colluvium derived from andesite and andesitic breccia. Slope is 5 to 90 percent. Elevation is 300 to 1,800 feet. The mean annual precipitation is 50 to 75 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 160 to 190 days.

These soils are classified as loamy-skeletal, mixed, mesic Andic Xerumbrepts.

Typical pedon of Schneider very gravelly loam, 5 to 30 percent slopes; about 1 mile north of Toutle; 500 feet south and 2,300 feet west of the northeast corner of sec. 19, T. 10 N., R. 1 E.

Oe—1 inch to 0; partially decomposed organic litter, including needles, leaves, twigs, bark chips, and cones; abrupt smooth boundary.

A—0 to 12 inches; dark reddish brown (5YR 3/2) very gravelly loam, brown (7.5YR 4/2) dry; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic, weakly smeary; many fine roots; many fine pores; 45 percent subangular andesite pebbles and 10 percent cobbles; moderately acid; gradual smooth boundary.

AB—12 to 28 inches; dark brown (7.5YR 3/4) extremely gravelly loam, brown (7.5YR 5/4) dry; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic, weakly smeary; common fine and medium roots; common fine pores; 50 percent subangular andesite pebbles and 15 percent cobbles; moderately acid; clear smooth boundary.

Bw—28 to 45 inches; reddish brown (5YR 5/4) extremely gravelly loam, light yellowish brown (10YR 6/4) dry; weak very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common fine roots; common fine pores; 55 percent angular andesite pebbles and 15 percent angular cobbles; moderately acid; abrupt wavy boundary.

R—45 inches; fractured andesite; some roots in fracture planes.

Depth to bedrock is 40 to 60 inches. The profile has hue of 5YR to 10YR throughout. The particle-size control section averages 35 to 80 percent pebbles and cobbles. The profile is slightly acid or moderately acid throughout.

The A horizon has value of 2 or 3 moist and 4 or 5 dry, and it has chroma of 2 or 3 moist. It is 35 to 55 percent pebbles and cobbles.

The AB horizon has value of 2 or 3 moist and 4 or 5 dry, and it has chroma of 2 to 4 moist or dry. It is extremely gravelly loam, very gravelly silt loam, or very cobbly silt loam. It is 35 to 55 percent pebbles and cobbles.

The Bw horizon has value of 3 to 5 moist and 4 to 7 dry, and it has chroma of 2 to 4 moist or dry. It is extremely gravelly loam, extremely gravelly silt loam, or extremely cobbly silt loam. It is 50 to 85 percent pebbles and cobbles.

Seaquest Series

The Seaquest series consists of very deep, well drained soils on hills and terraces. These soils formed in old alluvium and sediment derived from tuffaceous siltstone and sandstone. Slope is 0 to 30 percent. Elevation is 400 to 700 feet. The mean annual precipitation is 50 to 60 inches, the mean annual air temperature is about 48 degrees F, and the growing season is 200 to 240 days.

These soils are classified as clayey, mixed, mesic Xeric Palehumults.

Typical pedon of Seaquest silt loam, 0 to 8 percent slopes; about 5 miles northeast of Castle Rock; 1,400 feet east and 750 feet south of the northwest corner of sec. 33, T. 10 N., R. 1 W.

A—0 to 6 inches; dark brown (10YR 3/3) silt loam, brown (10YR 4/3) dry; weak medium subangular blocky structure parting to moderate fine subangular blocky; hard, firm, slightly sticky and slightly plastic; many fine and common coarse roots; many fine to coarse vesicular and tubular pores; moderately acid; clear wavy boundary.

BAt—6 to 12 inches; brown (7.5YR 4/4) silty clay loam, brown (7.5YR 5/4) dry; weak medium subangular blocky structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; common patchy distinct dark brown (7.5YR 3/4) clay films on faces of peds; many fine and common coarse roots; many fine to coarse vesicular and tubular pores; strongly acid; clear smooth boundary.

Bt1—12 to 24 inches; strong brown (7.5YR 4/6) silty clay loam, brown (7.5YR 5/4) dry; weak medium subangular blocky structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; common patchy distinct dark brown (7.5YR 3/4) clay films on faces of peds; common fine and few coarse roots; many fine to coarse vesicular and tubular pores; strongly acid; clear smooth boundary.

Bt2—24 to 38 inches; brown (7.5YR 4/4) silty clay loam, yellowish brown (10YR 5/4) dry; moderate medium subangular blocky structure parting to strong fine angular blocky; hard, firm, sticky and plastic; many discontinuous distinct reddish brown (5YR 4/4) clay films on faces of peds; common fine and few coarse roots; many fine to coarse vesicular and tubular pores; common medium irregular soft iron-manganese masses; very strongly acid; gradual smooth boundary.

Bt3—38 to 52 inches; strong brown (7.5YR 4/6) silty clay loam, reddish yellow (7.5YR 6/6) dry; moderate medium subangular blocky structure parting to strong fine angular blocky; hard, firm, sticky and plastic; many continuous prominent reddish brown (5YR 4/4) clay films on faces of peds; common fine and few coarse roots; many fine to coarse vesicular and tubular pores; very strongly acid; gradual smooth boundary.

BCt—52 to 60 inches; yellowish brown (10YR 5/4) silty clay loam, brownish yellow (10YR 6/6) dry;

moderate medium subangular blocky structure; hard, firm, sticky and plastic; many continuous prominent reddish brown (5YR 4/4) clay films on faces of peds; few fine and medium roots; very strongly acid.

The particle-size control section is 35 to 60 percent clay. It averages 0 to 5 percent rock fragments.

The A horizon has value of 2 or 3 moist and chroma of 2 to 4 moist. It is slightly acid to strongly acid.

The BAt and Bt horizons have hue of 10YR, 7.5YR, or 5YR, value of 3 to 5 moist, and chroma of 3 to 6 moist. They are silty clay loam, clay loam, or clay and average 35 to 60 percent clay. They are strongly acid or very strongly acid.

Semiahmoo Series

The Semiahmoo series consists of very deep, very poorly drained soils in depressional areas and on flood plains. These soils formed in highly decomposed herbaceous organic deposits. Slope is 0 to 1 percent. Elevation is 10 to 1,000 feet. The mean annual precipitation is 40 to 60 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 200 to 240 days.

These soils are classified as euic, mesic Typic Medisaprists.

Typical pedon of Semiahmoo muck, 0 to 1 percent slopes; about 1/2 mile east of Silver Lake; 950 feet east and 2,300 feet south of the northwest corner of sec. 4, T. 9 N., R. 1 W.

Oa1—0 to 15 inches; dark brown (10YR 3/3) muck, brown (10YR 5/3) dry; 10 percent fiber, less than 5 percent rubbed; moderate medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic, moderately smeary; many very fine and fine roots and common medium roots; strongly acid; clear smooth boundary.

Oa2—15 to 32 inches; dark brown (10YR 3/3) muck, dark gray (5Y 4/1) dry; about 30 percent fiber, less than 5 percent rubbed; massive; hard, friable, nonsticky and nonplastic, moderately smeary; common fine and medium roots; strongly acid; abrupt smooth boundary.

Oa3—32 to 46 inches; very dark gray (10YR 3/1) muck, very dark grayish brown (10YR 3/2) dry; about 75 percent fiber, less than 10 percent rubbed; massive; hard, friable, nonsticky and nonplastic; few fine and medium roots; strongly acid; abrupt smooth boundary.

C—46 to 60 inches; dark brown (10YR 3/3) silty clay loam, dark gray (5YR 4/1) dry; massive; very hard, friable, slightly sticky and slightly plastic; very strongly acid.

The organic material in which these soils formed is 46 to 120 inches thick or more. Fibers are mostly from wetland plants and grasses, but they may be as much as 5 percent wood. The content of fiber averages 20 to 60 percent, but it is less than 15 percent when rubbed. The tiers have hue of 10YR moist, value of 1 to 3 moist, and chroma of 1 or 2 moist. The profile is moderately acid to very strongly acid throughout. The C horizon is silty clay, silty clay loam, or gravelly sandy loam.

An apparent high water table is at the surface to 1 foot above the surface in November through May.

Siouxon Series

The Siouxon series consists of deep, well drained soils on mountainslopes and ridgetops. These soils formed in residuum and colluvium derived from andesite with an admixture of volcanic ash. Slope is 5 to 90 percent. Elevation is 300 to 1,800 feet. The mean annual precipitation is 60 to 80 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 175 to 200 days.

These soils are classified as medial-skeletal, mesic Andic Xerumbrepts.

Typical pedon of Siouxon very cobbly silt loam, 30 to 65 percent slopes; about 1 mile northeast of Ariel; 2,380 feet south and 1,850 feet east of the northwest corner of sec. 27, T. 6 N., R. 2 E.

Oe—3 inches to 0; loose, partially decomposed organic litter, including needles, leaves, twigs, bark chips, cones, and roots; abrupt smooth boundary.

A—0 to 14 inches; very dark brown (10YR 2/2) very cobbly silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 30 percent shotlike aggregates 2 to 5 millimeters in diameter; 20 percent angular and subangular pebbles and 20 percent cobbles; slightly acid; clear wavy boundary.

Bw1—14 to 28 inches; dark brown (10YR 3/3) very cobbly loam, pale brown (10YR 6/3) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common very fine, fine, medium, and coarse roots; many fine pores; 20 percent shotlike aggregates 2 to 5 millimeters in diameter; 20 percent angular and subangular pebbles and 35 percent cobbles; moderately acid; clear wavy boundary.

Bw2—28 to 43 inches; brown (10YR 4/3) extremely cobbly loam, light yellowish brown (10YR 6/4) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common very fine, fine, medium, and coarse roots; common fine pores; 20 percent angular and subangular pebbles and 50 percent cobbles; moderately acid; clear wavy boundary.

C—43 to 55 inches; dark yellowish brown (10YR 4/4) extremely cobbly loam, very pale brown (10YR 7/4) dry; massive; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common very fine, fine, medium, and coarse roots; common fine pores; 20 percent angular pebbles and 65 percent cobbles; moderately acid; abrupt irregular boundary.

R—55 inches; fractured, hard andesite; fines in fracture planes.

Depth to bedrock is 40 to 60 inches. The particle-size control section is 50 to 80 percent rock fragments, dominantly cobbles. Most of the rock fragments are angular or subangular and of local origin, but some rounded pebbles and cobbles are in some pedons at the lower elevations adjacent to glaciated valleys. The umbric epipedon is 10 to 20 inches thick. The profile is slightly acid or moderately acid throughout.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 moist and 4 or 5 dry, and chroma of 2 or 3 moist or dry. It is 15 to 30 percent pebbles and 20 to 30 percent cobbles.

The Bw horizon has hue of 10YR or 7.5YR, value of 3 or 4 moist and 5 to 7 dry, and chroma of 3 or 4 moist or dry. It is very cobbly loam, extremely cobbly loam, very cobbly silt loam, or extremely cobbly silt loam. It is 15 to 40 percent pebbles and 15 to 55 percent cobbles.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5 moist and 5 to 7 dry, and chroma of 3 or 4 moist or dry. It is extremely cobbly loam or extremely cobbly silt loam. It is 15 to 30 percent pebbles and 45 to 65 percent cobbles.

Snohomish Series

The Snohomish series consists of very deep, poorly drained soils on flood plains. These soils formed in alluvium underlain by organic material. Slope is 0 to 1 percent. Elevation is 10 to 550 feet. The mean annual precipitation is 35 to 50 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 200 to 240 days.

These soils are classified as fine-silty, mixed, nonacid, mesic Thapto-Histic Fluvaquents.

Typical pedon of Snohomish silty clay loam, 0 to 1 percent slopes; about 3 miles west of Longview; 175 feet west and 1,050 feet north of the southeast corner of sec. 25, T. 8 N., R. 3 W.

Ap—0 to 7 inches; dark gray (2.5Y 4/1) silty clay loam, gray (2.5Y 6/1) dry; many coarse prominent dark brown (7.5YR 3/4) mottles, yellowish red (5YR 5/8) dry; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine and medium roots; many fine irregular pores; strongly acid; abrupt smooth boundary.

Cg—7 to 18 inches; gray (5Y 5/1) silty clay loam, gray (5Y 6/1) dry; many medium and coarse prominent brown (7.5YR 4/4) mottles, strong brown (7.5YR 4/6) dry; massive; very hard, firm, slightly sticky and plastic; common fine roots; many very fine irregular pores; moderately acid; abrupt smooth boundary.

Oa1—18 to 23 inches; dark reddish brown (5YR 2.5/2) muck, dark grayish brown (10YR 4/2) dry; common fine distinct dark red (2.5YR 3/6) mottles, yellowish red (5YR 4/6) dry; massive; very hard, firm, nonsticky and nonplastic; 80 percent fiber, 10 percent rubbed; moderately acid; abrupt smooth boundary.

Oa2—23 to 40 inches; dark brown (7.5YR 3/2) muck, very dark grayish brown (10YR 3/2) dry; massive; very hard, firm, nonsticky and nonplastic; moderately acid; clear smooth boundary.

Oa3—40 to 60 inches; very dark grayish brown (10YR 3/2) muck, gray (N 5/0) dry; massive; hard, friable, slightly sticky and slightly plastic; 60 percent fiber, 10 percent rubbed; moderately acid.

The particle-size control section is 18 to 35 percent clay by weighted average. The mineral soil material is 0 to 15 percent fine sand or coarser material. The distribution of organic matter is irregular as depth increases. Depth to the organic layer is 14 to 36 inches. Fibers are mostly from grasses and sedges, but some pedons have as much as 15 percent wood fragments. The content of fiber is 30 to 80 percent, but it is 2 to 12 percent when rubbed. Thin, discontinuous layers of volcanic ash and diatomaceous earth 0.5 to 2.0 inches thick are between depths of 24 and 48 inches in some pedons.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4 moist and 5 to 7 dry, and chroma of 1 to 3 moist or dry. It is strongly acid to slightly acid.

The Cg horizon has hue or 10YR to 5Y, value of 3 to 6 moist and 5 to 8 dry, and chroma of 0 to 2 moist or

dry. It is silt loam or silty clay loam. It is strongly acid to slightly acid.

The Oa horizon has hue of 2.5Y to 2.5YR, value of 2 to 4 moist and 2 to 5 dry, and chroma of 0 to 3 moist or dry. It is muck or mucky peat. It is strongly acid or moderately acid.

An apparent high water table is at a depth of 1 to 4 feet in November through May.

Solo Series

The Solo series consists of moderately deep, moderately well drained soils on terraces and fans. These soils formed in aerially and alluvially deposited volcanic ash and pumice overlying weakly cemented lahar. Slope is 0 to 8 percent. Elevation is 400 to 1,600 feet. The mean annual precipitation is 70 to 90 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 150 to 200 days.

These soils are classified as mixed, mesic Typic Xeropsamments.

Typical pedon of Solo gravelly loamy sand, 0 to 8 percent slopes; about 18 miles northwest of Woodland; 1,350 feet west and 2,500 feet north of the southeast corner of sec. 19, T. 7 N., R. 3 E.

Oe—2 inches to 0; loose, partially decomposed organic litter, including needles, leaves, twigs, bark chips, cones, and roots; abrupt smooth boundary.

A—0 to 2 inches; very dark gray (10YR 3/1) gravelly loamy sand, dark gray (10YR 4/1) dry; very weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots, common medium roots, and few coarse roots; many very fine and fine pores; 15 percent pebbles; strongly acid; clear wavy boundary.

E—2 to 3 inches; very dark grayish brown (10YR 3/2) gravelly loamy sand, light brownish gray (10YR 6/2) dry; very weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium and coarse roots; many very fine and fine pores; 20 percent pebbles; moderately acid; clear wavy boundary.

Bw1—3 to 9 inches; dark brown (10YR 4/2) gravelly loamy sand, gray (10YR 6/1) and light yellowish brown (10YR 6/4) dry; very weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common coarse roots; many very fine and fine pores; 20 percent pebbles; moderately acid; gradual wavy boundary.

Bw2—9 to 15 inches; dark yellowish brown (10YR 4/4) gravelly loamy sand, light yellowish brown (10YR 6/4) dry; massive; loose, nonsticky and nonplastic; common very fine and fine roots and few medium and coarse roots; many very fine and fine pores; 20 percent pebbles; moderately acid; abrupt wavy boundary.

Bw3—15 to 20 inches; brown (10YR 5/3) and dark yellowish brown (10YR 4/6) gravelly loamy sand, light gray (10YR 7/2) and very pale brown (10YR 7/4) dry; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots and few medium and coarse roots; many very fine and fine pores; 20 percent pebbles; slightly acid; abrupt wavy boundary.

Bw4—20 to 23 inches; yellowish brown (10YR 5/4) gravelly sand, very pale brown (10YR 7/3) dry; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots and few medium roots; many very fine and fine pores; 25 percent pebbles; moderately acid; gradual wavy boundary.

Bw5—23 to 32 inches; brown (10YR 4/3 and 5/3) gravelly sand, light gray (10YR 7/2) and very pale brown (10YR 7/3) dry; very weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots and few medium roots; many very fine and fine pores; 25 percent pebbles; moderately acid; gradual wavy boundary.

2Cqm—32 to 60 inches; grayish brown (2.5Y 5/2) weakly cemented volcanic mudflow that breaks to extremely gravelly sand, light gray (2.5Y 7/2) dry; massive; very firm, nonsticky and nonplastic; very few very fine, fine, and medium roots; many medium pores; 65 percent pebbles and 20 percent cobbles; moderately acid.

Depth to the 2Cqm horizon is 20 to 40 inches. The upper part of the particle-size control section is more than 60 percent volcanic ash and pumice fragments that are less than 2 millimeters in diameter and 15 to 25 percent rock fragments and pumice fragments that are more than 2 millimeters in diameter. The lower part (2Cqm horizon) averages 60 to 80 percent rock fragments.

The E horizon has value of 2 or 3 moist and 4 to 6 dry, and it has chroma of 1 or 2 moist or dry. It is neutral to very strongly acid.

The Bw horizon has value of 4 or 5 moist and 6 or 7 dry, and it has chroma of 2 to 6 moist and 1 to 4 dry. The upper part is neutral to very strongly

acid, and the lower part is slightly acid or moderately acid.

The 2Cqm horizon has hue of 2.5Y or 5Y, value of 5 or 6 moist, and chroma of 1 or 2 moist or dry. It is weakly cemented lahar or pyroclastic flow material that breaks to extremely gravelly sand or extremely cobbly sand. It is 60 to 85 percent rock fragments. It is moderately acid or slightly acid.

A perched high water table is at a depth of 1.5 to 3.0 feet in November through March.

Speelyai Series

The Speelyai series consists of shallow, moderately well drained soils on terraces and terrace escarpments. These soils formed in aerially and alluvially deposited volcanic ash and lahar consisting of sand, gravel, and volcanic ash over weakly cemented lahar. Slope is 0 to 60 percent. Elevation is 400 to 600 feet. The mean annual precipitation is 55 to 70 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 200 to 240 days.

These soils are classified as mixed, mesic, shallow Typic Xeropsamments.

Typical pedon of Speelyai gravelly loamy sand, 0 to 8 percent slopes; about 0.2 mile southeast of Toutle; 2,100 feet west and 2,000 feet north of the southeast corner of sec. 30, T. 10 N., R. 1 E.

A1—0 to 2 inches; very dark gray (10YR 3/1) gravelly loamy sand, dark gray (10YR 4/1) dry; single grain; loose, nonsticky and nonplastic; many fine and medium roots; many very fine and fine pores; 15 percent pebbles; neutral; abrupt smooth boundary.

A2—2 to 5 inches; dark gray (10YR 4/1) gravelly loamy sand, light brownish gray (10YR 6/2) dry; single grain; loose, nonsticky and nonplastic; many fine and medium roots; many fine pores; 25 percent pebbles; very strongly acid; clear smooth boundary.

C—5 to 11 inches; gray (10YR 5/1) gravelly sand, gray (10YR 6/1) dry; single grain; loose, nonsticky and nonplastic; common fine roots; many fine pores; 30 percent pebbles; moderately acid; clear smooth boundary.

2Cqm—11 to 60 inches; gray (N 5/0) weakly cemented volcanic mudflow that breaks to very gravelly sand, light gray (N 7/0) dry; massive; extremely hard, extremely firm, nonsticky and nonplastic; common fine roots in the upper 3 inches and few fine roots to a depth of 30 inches; few fine pores; moderately acid.

Depth to the 2Cqm horizon is 10 to 20 inches. The particle-size control section is 10 to 25 percent volcanic ash and 15 to 35 percent rock fragments.

The A horizon has value of 3 or 4 moist and 4 to 6 dry, and it has chroma of 1 to 3 moist or dry. It is neutral to very strongly acid.

The C and 2Cqm horizons have value of 4 or 5 moist and 5 to 8 dry, and they have chroma of 0 to 2 moist or dry. They are 15 to 35 percent pebbles and 2 to 25 percent volcanic ash. They are moderately acid or slightly acid.

A perched high water table is at a depth of 0.5 to 1.5 feet in November through April.

Stahl Series

The Stahl series consists of moderately deep, well drained soils on ridgetops and mountainslopes. These soils formed in residuum and colluvium derived dominantly from andesite and andesitic volcanic breccia with an admixture of volcanic ash. Slope is 5 to 75 percent. Elevation is 2,800 to 4,500 feet. The mean annual precipitation is 70 to 100 inches, the mean annual air temperature is about 41 degrees F, and the growing season is 140 to 160 days.

These soils are classified as medial-skeletal Andic Cryumbrepts.

Typical pedon of Stahl very gravelly silt loam, 30 to 65 percent slopes; about 13 miles southeast of Toutle; 1,750 feet west and 700 feet south of the northeast corner of sec. 17, T. 9 N., R. 3 E.

Oe—2 inches to 0; partially decomposed organic litter, including needles, twigs, and bark chips; abrupt smooth boundary.

A—0 to 7 inches; very dark brown (10YR 2/2) very gravelly silt loam, brown (10YR 5/3) dry; moderate medium granular structure and very weak fine subangular blocky; soft, friable, nonsticky and slightly plastic, weakly smeary; many very fine roots and common medium and coarse roots; many fine irregular pores; 55 percent pebbles; slightly acid; clear wavy boundary.

AB—7 to 11 inches; dark brown (10YR 3/3) extremely gravelly silt loam, brown (10YR 5/3) dry; weak very fine and fine subangular blocky structure; soft, friable, nonsticky and slightly plastic, weakly smeary; many fine roots and common medium and coarse roots; many fine pores; 70 percent pebbles and 5 percent cobbles; slightly acid; abrupt wavy boundary.

Bw—11 to 24 inches; dark yellowish brown (10YR 4/4) extremely cobbly silt loam, very pale brown (10YR 7/3) dry; massive; slightly hard, friable, slightly

sticky and slightly plastic, weakly smeary; few fine roots; many fine pores; 25 percent pebbles and 60 percent cobbles; moderately acid; gradual irregular boundary.

BC—24 to 36 inches; yellowish brown (10YR 5/4) extremely cobbly silt loam, very pale brown (10YR 7/3) dry; massive; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few fine roots; many fine pores; 25 percent pebbles and 60 percent cobbles; moderately acid; gradual irregular boundary.

2R—36 inches; fractured andesite.

Depth to bedrock is 20 to 40 inches. The particle-size control section averages 55 to 85 percent rock fragments. The profile is slightly acid to strongly acid throughout.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3 moist and 4 or 5 dry, and chroma of 2 or 3 moist or dry. It is 35 to 55 percent pebbles.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 or 4 moist and 4 to 7 dry, and chroma of 3 or 4 moist or dry. It is extremely cobbly silt loam, extremely cobbly silty clay loam, extremely gravelly silt loam, or very gravelly silt loam. It is 50 to 90 percent rock fragments, including 45 to 75 percent pebbles and 5 to 35 percent cobbles.

The C horizon, where present, is extremely cobbly silt loam or extremely cobbly silty clay loam. It is 60 to 90 percent rock fragments, including 20 to 40 percent pebbles and 40 to 45 percent cobbles.

Stella Series

The Stella series consists of very deep, moderately well drained soils on broad ridgetops and hillslopes. These soils formed in loess over alluvium. Slope is 3 to 30 percent. Elevation is 300 to 700 feet. The mean annual precipitation is 45 to 55 inches, the mean annual air temperature is about 51 degrees F, and the growing season is 220 to 240 days.

These soils are classified as fine-silty, mixed, mesic Aquic Palexeralfs.

Typical pedon of Stella silt loam, 3 to 8 percent slopes; about 8 miles northwest of Longview; 700 feet south and 2,300 feet east of the northwest corner of sec. 9, T. 8 N., R. 3 W.

Oi and Oa—1 inch to 0; partially decomposed organic litter, including needles, twigs, and bark chips; abrupt smooth boundary.

A—0 to 11 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; many fine interstitial pores; common fine shotlike aggregates; strongly acid; gradual wavy boundary.

E1—11 to 20 inches; dark yellowish brown (10YR 3/4) silt loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; common fine tubular pores; common fine shotlike aggregates; very strongly acid; gradual wavy boundary.

E2—20 to 25 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; common medium distinct yellowish red (5YR 5/6) and grayish brown (10YR 5/2) mottles, reddish yellow (7.5YR 7/6) and light gray (2.5Y 7/2) dry; moderate and weak fine subangular blocky structure; slightly hard, friable, sticky and plastic; few medium and coarse roots and common fine roots; common fine tubular pores; few fine shotlike aggregates; strongly acid; clear wavy boundary.

2Bt/E1—25 to 37 inches; B part is dark brown (10YR 4/3) silty clay loam, light yellowish brown (10YR 6/4) dry, and E part is grayish brown (2.5Y 5/2) coatings of silt loam about $^{1}/_{16}$ to $^{3}/_{4}$ inch thick on faces of prisms, light gray (2.5Y 7/2) dry; moderate medium prismatic and subangular blocky structure; very hard, very firm, sticky and plastic; few fine roots to a depth of 37 inches, mostly in the E part; many fine and common medium tubular pores; faint continuous clay films on peds and in pores; common black manganese concretions and stains; strongly acid; irregular wavy boundary.

2Bt/E2—37 to 48 inches; B part is dark brown (7.5YR 3/4) silty clay loam, strong brown (7.5YR 5/6) dry, and E part is grayish brown (2.5Y 5/2) coatings of light silty clay loam $^{1}/_{16}$ to $^{3}/_{4}$ inch thick on faces of prisms, light gray (2.5Y 7/2) dry; moderate medium and coarse prismatic structure and moderate medium angular blocky; very hard, very firm, sticky and plastic; many fine and common medium tubular pores; faint continuous clay films on faces of peds and in pores; many black manganese concretions and stains; strongly acid; irregular wavy boundary.

2Bt—48 to 60 inches; brown (7.5YR 4/4) silty clay, brown (7.5YR 5/4) dry; moderate medium and coarse subangular blocky structure; very hard, very firm, sticky and plastic; common fine and medium tubular pores; prominent continuous clay films on faces of peds and in pores; many black manganese concretions and stains; strongly acid.

Depth to the 2Bt/E horizon is 22 to 36 inches.

The A horizon has hue of 7.5YR or 10YR, value of 2

or 3 moist, and chroma of 2 to 4 moist. It is very strongly acid or strongly acid.

The E horizon has hue of 7.5YR or 10YR, and it has value and chroma of 3 or 4 moist. It is very strongly acid or strongly acid.

The Bt part of the 2Bt/E1 horizon has hue of 5YR to 10YR, and the E part has hue of 2.5Y or 5Y. The horizon is silt loam or silty clay loam.

The 2Bt horizon has hue of 7.5YR or 5YR, value of 4 or 5 moist and 5 or 6 dry, and chroma of 4 to 6 moist or dry. It is silty clay or silty clay loam. It has manganese stains or concretions throughout.

A perched high water table is at a depth of 2 to 3 feet in November through April.

Studebaker Series

The Studebaker series consists of very deep, somewhat excessively drained soils on highly irregular, dissected valley floors. These soils formed in avalanche debris flow material. Slope is dominantly 0 to 20 percent, but it ranges to 100 percent. Elevation is 2,700 to 3,200 feet. The mean annual precipitation is about 125 to 140 inches, the mean annual air temperature is about 42 degrees F, and the growing season is 70 to 90 days.

These soils are classified as sandy-skeletal, mixed Typic Cryorthents.

Typical pedon of Studebaker very gravelly loamy sand, 0 to 20 percent slopes; about 23 miles southeast of Toutle; 300 feet east and 100 feet north of the southwest corner of sec. 12, T. 9 N., R. 4 E.

C1—0 to 8 inches; dark gray (10YR 4/1) very gravelly loamy sand, gray (10YR 6/1) dry; single grain; loose, nonsticky and nonplastic; many medium and coarse irregular pores; 40 percent pebbles, 20 percent cobbles, and 20 percent pumice fragments; moderately acid; clear wavy boundary.

C2—8 to 60 inches; dark gray (10YR 4/1) extremely gravelly loamy sand, gray (10YR 5/1) dry; single grain; loose, nonsticky and nonplastic; many medium and coarse irregular pores; 50 percent pebbles, 20 percent cobbles, and 20 percent pumice fragments; moderately acid.

The particle-size control section averages 35 to 85 percent rock fragments and 15 to 50 percent volcanic glass and glass aggregates. It is moderately acid to very strongly acid

The C1 horizon has hue of 2.5YR to 10YR, value of 3 to 6 moist and 4 to 8 dry, and chroma of 1 to 4 moist or dry. It is loamy sand to extremely cindery sand.

The C2 horizon has hue of 2.5YR to 10YR, value of 3 to 5 moist and 4 to 8 dry, and chroma of 1 to 3 moist. It is very gravelly loamy sand, extremely gravelly loamy sand, or extremely cobbly sand. It commonly has fine strata that have varying amounts of gravel.

Swem Series

The Swem series consists of very deep, moderately well drained soils on mountainslopes and toeslopes. These soils formed in colluvium derived from basalt and volcanic breccia overlying weathered marine siltstone and fine-grained sandstone. Slope is 5 to 65 percent. Elevation is 600 to 1,800 feet. The mean annual precipitation is 70 to 110 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 200 to 240 days.

These soils are classified as medial, mesic Andaquic Haplumbrepts.

Typical pedon of Swem cobbly silt loam, 5 to 30 percent slopes; about 5 miles southwest of Ryderwood; 1,800 feet west and 500 feet north of the southeast corner of sec. 13, T. 10 N., R. 4 W.

Oe—2 inches to 0; partially decomposed organic litter, including needles, leaves, twigs, bark chips, and cones; abrupt smooth boundary.

A—0 to 12 inches; very dark grayish brown (10YR 3/2) cobbly silt loam, dark brown (7.5YR 3/3) dry; moderate very fine and fine granular structure; slightly hard, very friable, nonsticky and nonplastic, weakly smeary; many very fine, fine, and medium roots and common coarse roots; many fine pores; 10 percent pebbles, including subangular basalt fragments and shotlike aggregates 2 to 10 millimeters in diameter, and 15 percent subangular cobbles as much as 20 centimeters in diameter; moderately acid; gradual wavy boundary.

Bw1—12 to 20 inches; dark yellowish brown (10YR 3/4) gravelly silt loam, dark brown (7.5YR 3/4) dry; few fine prominent grayish brown (10YR 5/2) mottles, very pale brown (10YR 8/3) dry; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many fine, medium, and coarse roots; many fine pores; 25 percent subangular basalt pebbles and 10 percent basalt cobbles; moderately acid; gradual wavy boundary.

Bw2—20 to 32 inches; dark yellowish brown (10YR 3/4) gravelly silt loam, brown (7.5YR 5/4) dry; common medium prominent grayish brown (10YR 5/2) mottles, very pale brown (10YR 8/3) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few fine, medium, and

coarse roots; common fine pores; 20 percent subangular basalt pebbles and 5 percent basalt cobbles; moderately acid; gradual smooth boundary.

2BC—32 to 60 inches; brown (10YR 4/3) clay loam, light yellowish brown (10YR 6/4) dry; common medium prominent grayish brown (10YR 5/2) mottles, very pale brown (10YR 8/3) dry; massive; slightly hard, friable, sticky and plastic; few fine roots; few fine pores; visible sand grains and mica chips derived from sandstone; few highly weathered, multicolored sandstone fragments about 10 centimeters in diameter; moderately acid.

Depth to the 2BC horizon is 20 to 35 inches. The profile has hue of 10YR or 7.5YR throughout. Mottles that have chroma of 2 or less are at a depth of 10 to 20 inches. The upper part of the particle-size control section averages 15 to 30 percent basalt or volcanic breccia fragments. The 2BC horizon is 0 to 80 percent soft siltstone fragments or fine-grained sandstone fragments. The profile is moderately acid to very strongly acid throughout.

The A horizon has value of 2 or 3 moist and 4 or 5 dry, and it has chroma of 2 or 3 moist or dry.

The Bw horizon has value of 3 or 4 moist and 3 to 5 dry, and it has chroma of 2 to 4 moist or dry. It is gravelly silt loam or cobbly loam and is 15 to 35 percent rock fragments.

The 2BC horizon has value of 3 to 5 moist and 3 to 6 dry, and it has chroma of 3 to 5 moist or dry. It is silt loam, loam, clay loam, or silty clay loam.

A perched high water table is at a depth of 2.5 to 3.5 feet in November through April.

Swift Series

The Swift series consists of very deep, well drained soils on mountainslopes and ridgetops. These soils formed in residuum and colluvium derived from volcanic ash and andesite with a mantle of volcanic ash and cinders. Slope is 5 to 90 percent. Elevation is 1,600 to 2,800 feet. The mean annual precipitation is 90 to 120 inches, the mean annual air temperature is about 43 degrees F, and the growing season is 140 to 175 days.

These soils are classified as ashy over loamy-skeletal, mixed, frigid Typic Vitrandepts.

Typical pedon of Swift sandy loam, 30 to 65 percent slopes; about 3 miles northwest of Cougar; 700 feet east and 700 feet north of the southwest corner of sec. 15, T. 7 N., R. 4 E.

Oe—2 inches to 1 inch; partially decomposed leaves, needles, twigs, and moss; abrupt smooth boundary.

Oa—1 inch to 0; decomposed organic litter; abrupt smooth boundary.

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; many medium and coarse irregular pores; 10 percent subangular pumice fragments 2 to 10 millimeters in diameter; moderately acid; abrupt wavy boundary.

A2—2 to 4 inches; dark yellowish brown (10YR 4/4) sandy loam, yellowish brown (10YR 5/4) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; many medium and coarse irregular pores; 10 percent subangular pumice fragments 2 to 10 millimeters in diameter and 10 percent angular and subangular pebbles; strongly acid; clear wavy boundary.

Bw1—4 to 12 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam, light yellowish brown (10YR 6/4) dry; weak fine and medium subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots and few medium roots; many fine and medium irregular pores; 10 percent pumice fragments 2 to 10 millimeters in diameter and 10 percent angular and subangular pebbles; moderately acid; clear wavy boundary.

Bw2—12 to 24 inches; yellowish brown (10YR 5/4) gravelly sandy loam, very pale brown (10YR 7/4) dry; moderate fine and medium subangular blocky structure; soft, friable, nonsticky and slightly plastic; many very fine and fine roots; many fine irregular pores; 10 percent pumice fragments 5 to 10 millimeters in diameter and 15 percent angular and subangular andesite pebbles; moderately acid; clear wavy boundary.

2Bwb—24 to 60 inches; brown (10YR 5/3) extremely cobbly loam, very pale brown (10YR 7/4) dry; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and few coarse roots; many fine and medium irregular pores; 40 percent pebbles and 25 percent cobbles; moderately acid.

The upper part of the particle-size control section averages 10 to 20 percent pumice fragments, and the lower part averages 40 to 75 percent hard rock fragments.

The A horizon has hue of 10YR or 7.5YR, value of 2 to 4 moist and 5 or 6 dry, and chroma of 1 to 3 moist and 2 or 3 dry. It is 5 to 10 percent pebbles. It is loamy

sand or sandy loam. It is moderately acid or strongly acid.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5 moist and 5 to 7 dry, and chroma of 3 or 4 moist or dry. It is 5 to 20 percent pebbles and 15 to 20 percent pumice fragments. It is very gravelly sandy loam, gravelly sandy loam, very gravelly loam, or gravelly silt loam. It is moderately acid or slightly acid.

The 2Bwb horizon has hue of 10YR or 2.5Y, value of 3 to 5 moist and 6 or 7 dry, and chroma of 3 or 4 moist or dry. It is very gravelly, very cobbly, or extremely cobbly loam or clay loam. It is 20 to 40 percent pebbles, 15 to 25 percent cobbles, and 5 to 10 percent stones. It is moderately acid or slightly acid.

Vader Series

The Vader series consists of very deep, well drained soils on hillslopes. These soils formed in residuum and colluvium derived dominantly from quartzitic marine sandstone. Slope is 5 to 65 percent. Elevation is 50 to 1,800 feet. The mean annual precipitation is 50 to 70 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 175 to 220 days.

These soils are classified as coarse-loamy, mixed, mesic Dystric Xerochrepts.

Typical pedon of Vader loam, 5 to 30 percent slopes; about 5 miles southwest of Ryderwood; 550 feet south and 1,100 feet east of the northwest corner of sec. 13, T. 10 N., R. 4 W.

Oe—2 inches to 0; partially decomposed organic litter, including needles, leaves, twigs, and bark; abrupt smooth boundary.

A—0 to 6 inches; dark yellowish brown (10YR 3/4) loam, yellowish brown (10YR 5/4) dry; weak very fine and fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; many very fine pores; 10 percent soft sandstone pebbles and rounded shotlike aggregates 2 to 10 millimeters in diameter; moderately acid; clear wavy boundary.

BA—6 to 13 inches; dark yellowish brown (10YR 4/4) fine sandy loam, light yellowish brown (10YR 6/4) dry; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine, fine, and medium roots; common fine tubular pores; 10 percent soft sandstone pebbles and rounded shotlike aggregates 2 to 10 millimeters in diameter; moderately acid; clear wavy boundary.

Bw—13 to 24 inches; dark yellowish brown (10YR 4/6) fine sandy loam, brownish yellow (10YR 6/6) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine, medium, and coarse roots; few fine tubular pores; strongly acid; gradual wavy boundary.

BC—24 to 40 inches; dark yellowish brown (10YR 4/6) fine sandy loam, yellow (10YR 7/6) dry; weak medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few fine and medium roots; few fine pores; moderately acid; clear wavy boundary.

C—40 to 60 inches; dark yellowish brown (10YR 4/6) loamy sand, yellow (10YR 7/6) dry; massive; soft, very friable, nonsticky and nonplastic; few fine pores; moderately acid.

The particle-size control section is 0 to 30 percent pebble- and cobble-sized soft sandstone fragments. The profile is moderately acid to very strongly acid throughout.

The A horizon has hue of 10YR to 5YR, value of 2 to 4 moist and 4 or 5 dry, and chroma of 2 to 4 moist or dry. It is 0 to 30 percent soft sandstone pebbles and shotlike aggregates.

The BA and Bw horizons have hue of 10YR to 5YR, value of 3 or 4 moist and 5 to 7 dry, and chroma of 3 to 6 moist or dry. They are loam, fine sandy loam, or sandy loam. They are 0 to 30 percent rounded and subangular, soft sandstone pebbles.

The BC horizon has hue of 10YR or 7.5YR, value of 4 or 5 moist and 6 to 8 dry, and chroma of 3 to 6 moist or dry. It is fine sandy loam, sandy loam, or loamy sand. It is 0 to 30 percent soft sandstone pebbles.

The C horizon has hue of 2.5YR to 7.5YR, value of 4 or 5 moist and 5 to 7 dry, and chroma of 4 to 8 moist or dry. It is fine sandy loam, sandy loam, loamy fine sand, or loamy sand. It is 0 to 50 percent rounded or subangular soft sandstone fragments.

Vanson Series

The Vanson series consists of deep and very deep, well drained soils on mountainslopes and broad ridgetops. These soils formed in residuum and colluvium derived from igneous rock with a mantle of volcanic ash and pumice. Slope is 5 to 90 percent. Elevation is 2,600 to 4,500 feet. The mean annual precipitation is 80 to 130 inches, the mean annual air temperature is about 39 degrees F, and the growing season is 90 to 140 days.

These soils are classified as ashy over loamy-skeletal, mixed Typic Cryorthods.

Typical pedon of Vanson sandy loam, 30 to 65 percent slopes; about 5 miles north of Cougar;

2,575 feet south and 1,780 feet east of the northwest corner of sec. 10, T. 7 N., R. 4 E.

Oe—2 inches to 1 inch; loose, partially decomposed organic litter, including needles, leaves, twigs, wood, bark chips, and old roots; abrupt smooth boundary.

Oa—1 inch to 0; decomposed organic matter; abrupt wavy boundary.

E—0 to 1 inch; dark gray (10YR 4/1) loamy sand, light gray (10YR 7/1) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; many fine pores; 5 percent subangular pumice fragments 2 to 5 millimeters in diameter; moderately acid; abrupt wavy boundary.

Bs1—1 inch to 6 inches; dark brown (7.5YR 3/4) sandy loam when mixed, brown (7.5YR 5/4) dry; common fine faint strong brown (7.5YR 3/6) mottles, strong brown (7.5YR 4/6) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; many fine, medium, and coarse roots; many fine pores; 5 percent subangular pumice fragments 2 to 20 millimeters in diameter; moderately acid; abrupt wavy boundary.

2Bs2—6 to 12 inches; gray (10YR 5/1) gravelly loamy sand, light gray (10YR 7/1) dry; many fine prominent strong brown (7.5YR 4/6 and 5/8) mottles, reddish yellow (7.5YR 7/6 and 7/8) dry; massive; slightly hard, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; many fine pores; 20 percent subangular pumice fragments 2 to 20 millimeters in diameter; 10 percent hard pebbles and shotlike aggregates 2 to 5 millimeters in diameter; slightly acid; abrupt wavy boundary.

3Bs3—12 to 18 inches; dark yellowish brown (10YR 3/4) sandy loam, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic, weakly smeary; many fine, medium, and coarse roots; many fine pores; 5 percent subangular pumice fragments 2 to 20 millimeters in diameter; 10 percent hard pebbles; slightly acid; abrupt irregular boundary.

4Bs4—18 to 20 inches; strong brown (7.5YR 5/6) and yellowish red (5YR 5/8) very gravelly loamy sand, reddish yellow (7.5YR 7/6 and 5YR 6/8) dry; single grain; loose; many fine roots; 55 percent subangular pumice fragments 2 to 20 millimeters in diameter; neutral; abrupt irregular boundary.

5Bw—20 to 39 inches; yellowish brown (10YR 5/4) very gravelly loam, very pale brown (10YR 7/4) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many fine and medium roots and common coarse roots; many fine pores; 40 percent subangular pebbles and 10 percent cobbles; moderately acid; clear wavy boundary.

5BC—39 to 51 inches; dark yellowish brown (10YR 4/4) very gravelly loam, very pale brown (10YR 7/4) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common fine and medium roots and few coarse roots; 40 percent subangular pebbles and 15 percent cobbles; moderately acid; abrupt irregular boundary.

5R—51 inches; hard andesite.

Depth to bedrock is 40 to 60 inches or more. The upper 5 to 20 inches of the particle-size control section, by weighted average, is more than 60 percent volcanic ash and pumice and less than 35 percent pumice fragments more than 2 millimeters in diameter. The lower part of the particle-size control section averages 35 to 70 percent angular and subangular pebbles and cobbles and less than 60 percent volcanic ash and pumice. Below the E horizon, the profile is strongly acid to neutral.

The E horizon has value of 3 to 5 moist and 5 to 8 dry, and it has chroma of 1 or 2 moist or dry. It is moderately acid or strongly acid. It is loamy sand, sandy loam, or cobbly sandy loam.

The Bs horizon has hue of 5YR to 10YR, value of 3 to 6 moist and 5 to 8 dry, and chroma of 1 to 8 moist or dry. It is mottled or variegated, especially in pedons that have pumice. The horizon is sandy loam, gravelly loamy sand, or very gravelly loamy sand. It averages 5 to 35 percent pumice fragments, 0 to 15 percent pebbles, and 0 to 10 percent shotlike aggregates.

The Bw and BC horizons have hue of 5YR to 10YR, value of 4 or 5 moist and 6 or 7 dry, and chroma of 4 to 6 moist or dry. They are very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam, extremely gravelly sandy loam, or extremely gravelly loamy sand. They are 30 to 55 percent subangular and angular pebbles, 10 to 30 percent cobbles, and 0 to 10 percent stones. In some areas glacial till is below a depth of 40 inches, and in other areas tuff is below a depth of 40 inches.

Voight Series

The Voight series consists of very deep, well drained soils on hillslopes, mountainslopes, and broad ridgetops. These soils formed in residuum derived from andesite and interbedded tuff. Slope is 5 to 30 percent.

Elevation is 1,800 to 2,800 feet. The mean annual precipitation is 60 to 90 inches, the mean annual air temperature is about 43 degrees F, and the growing season is 130 to 160 days.

These soils are classified as fine-loamy, mixed Eutric Glossoboralfs.

Typical pedon of Voight silt loam, 5 to 30 percent slopes; about 7 miles southeast of Toutle; 1,850 feet west and 650 feet north of the southeast corner of sec. 27, T. 9 N., R. 1 E.

Oe—1 inch to 0; partially decomposed organic litter, including needles, leaves, twigs, bark chips, and cones; abrupt wavy boundary.

A—0 to 10 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; soft, friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots and few coarse roots; many very fine and fine interstitial pores; 5 percent subangular andesite pebbles; 15 percent shotlike aggregates 2 to 10 millimeters in diameter; moderately acid; clear wavy boundary.

Bt1—10 to 21 inches; dark yellowish brown (10YR 3/4) silty clay loam, brown (10YR 5/3) dry; moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; many very fine and fine roots, common medium roots, and few coarse roots; common fine pores; few faint patchy clay films on faces of peds; 5 percent subangular andesite pebbles and shotlike aggregates 2 to 10 millimeters in diameter; moderately acid; clear wavy boundary.

Bt2—21 to 37 inches; dark yellowish brown (10YR 3/4) silty clay loam, yellowish brown (10YR 5/4) dry; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and plastic; common very fine and fine roots and few medium roots; many very fine and fine pores; many faint and few distinct clay films on faces of peds and lining pores; strongly acid; gradual wavy boundary.

Bt3—37 to 60 inches; brown (10YR 4/3) silty clay loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; hard, friable, slightly sticky and plastic; few very fine and fine roots; common fine pores; many faint clay films on faces of peds; strongly acid.

The particle-size control section is 27 to 35 percent clay. The profile is 0 to 25 percent rock fragments. It is moderately acid or strongly acid throughout.

The A horizon has value of 2 or 3 moist and 4 or 5 dry, and it has chroma of 2 or 3 moist or dry.

The Bt horizon has value of 3 to 5 moist and 5 or 6 dry, and it has chroma of 3 to 6 moist or dry. The upper part of the horizon is silty clay loam, clay loam, or gravelly silty clay loam, and the lower part is gravelly silt loam, gravelly loam, silt loam, or silty clay loam.

Winston Series

The Winston series consists of very deep, well drained soils on river terraces. These soils formed in mixed alluvium and volcanic ash overlying glacial outwash sand, pebbles, and cobbles. Slope is 0 to 8 percent. Elevation is 300 to 900 feet. The mean annual precipitation is 60 to 80 inches, the mean annual air temperature is about 50 degrees F, and the growing season is 150 to 200 days.

These soils are classified as coarse-loamy over sandy or sandy-skeletal, mixed, mesic Typic Haplorthods.

Typical pedon of Winston silt loam, 0 to 8 percent slopes, about 15 miles east of Kelso; 800 feet east and 700 feet north of the southwest corner of sec. 20, T. 8 N., R. 2 E.

A—0 to 4 inches; dark brown (7.5YR 3/2) silt loam, dark yellowish brown (10YR 4/4) dry; moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic, weakly smeary; common very fine and fine roots; common very fine tubular pores; 5 percent shotlike aggregates; 5 percent pebbles; moderately acid; clear smooth boundary.

Bs1—4 to 15 inches; dark reddish brown (5YR 3/4) loam, strong brown (7.5YR 5/6) dry; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; few very fine and fine roots; many very fine tubular pores; 5 percent shotlike aggregates; 5 percent pebbles; slightly acid; clear smooth boundary.

Bs2—15 to 24 inches; dark reddish brown (5YR 3/4) loam, brown (7.5YR 5/4) dry; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; few very fine and fine roots; many very fine tubular pores; 2 percent shotlike aggregates; 10 percent pebbles; moderately acid; gradual wavy boundary.

2C—24 to 60 inches; very dark grayish brown (10YR 3/2) extremely gravelly sand, brown (10YR 4/3) dry; single grain; loose; few very fine roots; many very fine interstitial pores; 70 percent pebbles; neutral.

Depth to extremely gravelly sand is 14 to 38 inches. The part of the particle-size control section above the 2C horizon averages 5 to 35 percent rock fragments.

The A horizon has hue of 10YR to 5YR, value of 2 or 3 moist and 4 or 5 dry, and chroma of 2 to 4 moist or dry. It is slightly acid or moderately acid.

The Bs horizon has hue of 7.5YR or 5YR, value of 3 to 5 moist and 5 or 6 dry, and chroma of 3 to 6 moist or dry. It is loam, gravelly loam, or gravelly fine sandy loam. It is slightly acid or moderately acid.

The 2C horizon has hue of 10YR to 2.5YR, value of 3 to 5 moist and 4 to 7 dry, and chroma of 2 or 3 moist or dry. It is very gravelly loamy sand or extremely gravelly sand. Thin lenses of sandy loam or loamy sand are in some pedons. The horizon is 50 to 90 percent rock fragments, by volume, most of which are rounded pebbles and cobbles.

Wyant Series

The Wyant series consists of moderately deep, well drained soils on mountainslopes. These soils formed in residuum and colluvium derived from tuff and tuff breccia. Slope is 5 to 65 percent. Elevation is 900 to 1,800 feet. The mean annual precipitation is 60 to 70 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 150 to 200 days.

These soils are classified as fine, montmorillonitic, mesic Ultic Argixerolls.

Typical pedon of Wyant loam, 5 to 30 percent slopes; about 6 miles southeast of Toutle; 1,300 feet west and 2,220 feet south of the northeast corner of sec. 6, T. 9 N., R. 2 E.

Oe—2 inches to 0; partially decomposed organic litter, including needles, leaves, twigs, and bark; abrupt smooth boundary.

A1—0 to 4 inches; very dark brown (10YR 2/2) loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots throughout; many fine and common medium vesicular and tubular pores; strongly acid; abrupt smooth boundary.

A2—4 to 12 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; many fine and common coarse roots throughout; many fine and common medium vesicular and tubular pores; strongly acid; clear smooth boundary.

Bt1—12 to 19 inches; very dark grayish brown (10YR 3/2) clay loam, brown (10YR 5/3) dry; weak medium subangular blocky structure parting to strong fine subangular blocky; hard, firm, sticky and plastic; many discontinuous distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; many fine and common coarse roots throughout; common fine and few medium vesicular and tubular pores; 5 percent pebbles of pyroclastic rock; very strongly acid; clear smooth boundary.

Bt2—19 to 26 inches; dark yellowish brown (10YR 4/4) clay loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; many discontinuous distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine and few coarse roots throughout; common fine and few medium vesicular and tubular pores; very strongly acid; clear smooth boundary.

BCt1—26 to 34 inches; dark yellowish brown (10YR 4/4) clay loam, pale brown (10YR 6/3) dry; moderate medium subangular blocky structure; slightly hard, firm, sticky and plastic; many discontinuous distinct black (N 2.5/0) and dark yellowish brown (10YR 4/4) clay films on faces of peds; few very fine and fine vesicular and tubular pores; very strongly acid; clear smooth boundary.

BCt2—34 to 39 inches; dark brown (10YR 4/3) sandy clay loam, pale brown (10YR 6/3) dry; few medium prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; many discontinuous distinct brown (10YR 4/3) clay films on faces of peds; few fine, medium, and coarse roots throughout; few fine vesicular and tubular pores; very strongly acid; clear smooth boundary.

Crt—39 to 49 inches; brown (10YR 5/3) weathered tuff, very pale brown (10YR 7/3) dry; few patchy distinct grayish brown (10YR 4/2) clay films on lower surfaces of peds and stones.

Depth to bedrock is 20 to 40 inches. The particle-size control section averages 18 to 30 percent clay. Base saturation, by sum of cations, is less than 75 percent.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 moist and 4 or 5 dry, and chroma of 2 or 3 moist or dry.

The Bt horizon has hue of 10YR or 7.5YR, value of 3 or 4 moist and 5 or 6 dry, and chroma of 2 to 4 moist or dry. It is clay, silty clay, silty clay loam, or clay loam and has many distinct clay films. It is very strongly acid or strongly acid.

The BCt horizon has hue of 10YR, value of 4 or 5 moist and 6 or 7 dry, and chroma of 3 or 4 moist or dry. It is sandy clay loam or clay loam.

Xana Series

The Xana series consists of very deep, well drained soils on mountainslopes and ridgetops. These soils formed in layers of pumice and ash. Slope is 5 to 65 percent. Elevation is 2,800 to 4,200 feet. The mean annual precipitation is 120 to 130 inches, the mean annual air temperature is about 38 degrees F, and the growing season is 110 to 125 days.

These soils are classified as ashy over cindery Typic Cryorthods.

Typical pedon of Xana loamy sand, 30 to 65 percent slopes; about 8 miles north of Cougar; 2,600 feet north and 1,450 feet east of the southwest corner of sec. 14, T. 8 N., R. 4 E.

Oe—3 inches to 0; loose, partially decomposed organic litter, including needles, twigs, bark chips, cones, charcoal, and roots; abrupt smooth boundary.

E—0 to 1.5 inches; dark gray (10YR 4/1) loamy sand (volcanic ash), light gray (10YR 7/1) dry; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; many fine pores; moderately acid; abrupt wavy boundary.

E/Bw1—1.5 to 8.0 inches; loamy sand (volcanic ash) that is 70 percent dark gray (10YR 4/1), light gray (10YR 7/1) dry, and 30 percent dark brown (7.5YR 3/4), strong brown (7.5YR 5/6) dry; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; many fine pores; 10 percent pebble-sized subangular pumice fragments; moderately acid; clear wavy boundary.

E/Bw2—8 to 20 inches; gravelly loamy sand that is 60 percent grayish brown (10YR 5/2), white (10YR 8/1) dry, and 40 percent strong brown (7.5YR 5/6), reddish yellow (7.5YR 7/6) dry; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic, weakly smeary; many fine, medium, and coarse roots; common fine pores; 20 percent pebble-sized subangular pumice fragments; moderately acid; clear wavy boundary.

2Bsb1—20 to 32 inches; brown (10YR 4/3) very gravelly sandy loam, very pale brown (10YR 7/3) dry; many very fine and fine prominent yellowish brown (10YR 5/8) mottles, yellow (10YR 7/8) dry; massive; soft, very friable, nonsticky and nonplastic, weakly smeary; many fine roots and few medium and coarse roots; 50 percent yellowish red (5YR 5/8) and reddish yellow (7.5YR 6/8) pebble-sized subangular pumice fragments, reddish yellow (5YR 6/8 and 7.5YR 7/6) dry; neutral; abrupt wavy boundary.

2Bsb2—32 to 60 inches; yellowish red and reddish yellow (5YR 5/8 and 7.5YR 6/8) extremely gravelly loamy sand, reddish yellow (5YR 6/8 and 7.5YR 7/6) dry; single grain; loose; common fine roots and few medium and coarse roots; 70 percent subangular pumice fragments 2 millimeters to 10 centimeters in diameter and 10 percent dark bluish gray or black pebble-sized subangular hard volcanic rock fragments; neutral.

Depth to the 2Bsb horizon is 15 to 25 inches. The profile is 60 percent or more volcanic ash and pumice throughout. The upper part of the particle-size control section is 15 to 30 percent pumice fragments, and the lower part is more than 35 percent pumice fragments.

The E horizon has value of 3 to 5 moist and 6 to 8 dry, and it has chroma of 1 or 2 moist or dry.

The E part of the E/Bw horizon has value of 4 or 5 moist and 6 to 8 dry, and it has chroma of 1 to 3 moist or dry. The Bw part has hue of 7.5YR or 5YR, value of 3 to 5 moist and 5 to 7 dry, and chroma of 4 to 8 moist or dry. It is loamy sand or gravelly loamy sand. It is 5 to 30 percent pebble-sized pumice fragments. It is slightly acid or moderately acid.

The 2Bsb1 horizon has value of 4 or 5 moist and 6 to 8 dry, and it has chroma of 2 or 3 moist or dry. It has mottles that have hue of 10YR to 5YR, value of 4 or 5 moist and 6 to 8 dry, and chroma of 4 to 8 moist or dry, and it has pumice fragments that have hue of 7.5YR or 5YR, value of 5 or 6 moist and 6 to 8 dry, and chroma of 6 to 8 moist or dry. The horizon is very gravelly sandy loam or very gravelly loamy sand. It is 35 to 55 percent pebble-sized pumice fragments. It is neutral or slightly acid.

The 2Bsb2 horizon has hue of 7.5YR or 5YR, value of 5 or 6 moist and 6 to 8 dry and chroma of 2 to 8 moist or dry. It is extremely gravelly loamy sand or extremely gravelly sand. It is 60 to 90 percent pebble- and cobble-sized pumice fragments and other volcanic ejecta. It is neutral or slightly acid.

Xeno Series

The Xeno series consists of deep, well drained soils on benches, mountainslopes, and broad ridgetops. These soils formed in residuum and colluvium derived from tuff and tuffaceous breccia with a mantle of volcanic ash and loess. Slope is 5 to 65 percent. Elevation is 1,800 to 2,800 feet. The mean annual precipitation is 70 to 100 inches, the mean annual air temperature is about 43 degrees F, and the growing season is 140 to 190 days.

These soils are classified as medial, frigid Andic Haplumbrepts.

Typical pedon of Xeno silt loam, 30 to 65 percent slopes; about 14 miles east of Kelso; 1,000 feet north and 3,000 feet east of the southwest corner of sec. 35, T. 8 N., R. 1 E.

Oe—2 inches to 0; loose, partially decomposed organic litter, including needles, leaves, twigs, bark chips, cones, and roots; abrupt smooth boundary.

A1—0 to 3 inches; very dark brown (10YR 2/2) silt loam, dark brown (10YR 3/3) dry; weak very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 10 percent shotlike aggregates; 5 percent subangular pebbles; moderately acid; clear wavy boundary.

A2—3 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 5 percent shotlike aggregates; 10 percent subangular pebbles and cobbles; moderately acid; clear wavy boundary.

Bw1—10 to 18 inches; dark brown (10YR 3/3) silt loam, yellowish brown (10YR 5/4) dry; moderate fine and medium subangular blocky structure parting to moderate very fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 5 percent shotlike aggregates; 10 percent subangular pebbles and cobbles; moderately acid; clear wavy boundary.

Bw2—18 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure parting to moderate very fine and fine subangular blocky; hard, friable, slightly sticky and slightly plastic, weakly smeary; common very fine, fine, medium, and coarse roots; many fine pores; 5 percent angular and subangular soft pebble-sized tuff fragments; strongly acid; abrupt irregular boundary.

2C1—24 to 38 inches; yellowish brown (10YR 5/8) silt loam, yellow (10YR 7/8) dry; massive; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common fine, medium, and coarse roots; common fine pores; 40 percent angular and subangular soft pebble-sized tuff fragments; strongly acid; abrupt irregular boundary.

2C2—38 to 54 inches; light olive brown (2.5Y 5/4) and light yellowish brown (2.5Y 6/4) silt loam, pale yellow (2.5Y 7/4 and 8/4) dry; massive; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few fine roots; few pores; 50 percent angular and subangular soft pebble-sized tuff fragments; strongly acid; clear irregular boundary.

2Cr—54 to 64 inches; multicolored, highly weathered and fractured tuff; black manganese and iron stains and fine roots in fracture planes.

Depth to bedrock is 40 to 60 inches. The particle-size control section is 15 to 55 percent soft pebble- and cobble-sized fragments. The profile is slightly acid to strongly acid throughout.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 moist and 3 to 5 dry, and chroma of 2 or 3 moist or dry. In some pedons the upper part has 5 to 30 percent colluvial rock fragments.

The Bw horizon has hue of 10YR to 5YR, value of 3 to 5 moist and 5 to 7 dry, and chroma of 3 to 6 moist or dry. It is silt loam, gravelly silt loam, silty clay loam, or gravelly silty clay loam. It is 5 to 20 percent pebbles and 0 to 5 percent cobbles.

The C horizon has hue of 2.5Y to 2.5YR, value of 4 or 5 moist and 5 to 8 dry, and chroma of 4 to 8 moist or dry. The highly weathered tuff varies in color from pedon to pedon, and it is multicolored in some pedons. The horizon is silt loam or silty clay loam. It is 35 to 60 percent soft pebbles and cobbles.

Yalelake Series

The Yalelake series consists of very deep, well drained soils on hillslopes, terraces, and terrace escarpments. These soils formed in glaciofluvial deposits of volcanic ash and pumice over pyroclastic material with a mantle of volcanic ash. Slope is 5 to 90 percent. Elevation is 300 to 1,800 feet. The mean annual precipitation is 80 to 120 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 125 to 200 days.

These soils are classified as ashy over medial, mesic Umbric Vitrandepts.

Typical pedon of Yalelake sandy loam, 30 to 65 percent slopes; about 1 mile north of Cougar; 2,200 feet west and 1,500 feet south of the northeast corner of sec. 27, T. 7 N., R. 4 E.

Oi—2.0 inches to 0.5 inch; loose; needles, leaves, and twigs; abrupt smooth boundary.

Oa—0.5 inch to 0; decomposed organic material; abrupt smooth boundary.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) sandy loam (volcanic ash), brown (10YR 5/3) dry;

weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots and common fine and medium roots; many very fine irregular pores; strongly acid; clear wavy boundary.

AB—2 to 12 inches; dark brown (10YR 3/3) sandy loam (volcanic ash), brown (10YR 5/3) dry; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots, common medium roots, and few coarse roots; many fine irregular pores; 15 percent pebble-sized pumice fragments; strongly acid; clear wavy boundary.

Bw1—12 to 17 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam, very pale brown (10YR 7/4) dry; moderate fine and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots and few medium and coarse roots; many fine irregular pores; 25 percent pebble-sized pumice fragments; moderately acid; gradual wavy boundary.

Bw2—17 to 26 inches; dark yellowish brown (10YR 4/6) and yellowish brown (10YR 5/6) gravelly sandy loam, brownish yellow (10YR 6/6) and very pale brown (10YR 7/4) dry; moderate very fine and fine subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; many very fine and common fine roots; 30 percent pebble-sized pumice fragments; moderately acid; clear wavy boundary.

2Bw3—26 to 37 inches; yellowish brown (10YR 5/6) sandy loam, very pale brown (10YR 7/4) dry; massive; slightly hard, friable, nonsticky and slightly plastic; common very fine and few fine roots; common fine pores; 10 percent weathered pumice fragments; moderately acid; abrupt wavy boundary.

3C1—37 to 47 inches; yellowish brown (10YR 5/4) sandy loam, very pale brown (10YR 7/4) and yellow (10YR 7/6) dry; massive; slightly hard, friable, nonsticky and slightly plastic; common very fine and fine roots; common fine irregular pores; 10 percent weathered pumice fragments; moderately acid; abrupt wavy boundary.

4C2—47 to 52 inches; yellowish brown (10YR 5/8) gravelly sand, yellow (10YR 7/6) and very pale brown (10YR 7/3) dry; massive; soft, very friable, nonsticky and nonplastic, weakly smeary; few fine roots; many very fine and fine pores; 20 percent pumice pebbles; slightly acid; abrupt wavy boundary.

5C3—52 to 60 inches; yellowish brown (10YR 5/6) loam, very pale brown (10YR 7/4) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine pores; 10 percent weathered pumice fragments; moderately acid.

Depth of the solum is 35 to 45 inches. The mantle of ash is 17 to 25 inches thick, and it is more than 60 percent volcanic ash and pumice. The particle-size control section averages 10 to 30 percent rock fragments. The umbric epipedon is 10 to 13 inches thick.

The A and AB horizons have value of 2 or 3 moist and 4 or 5 dry, and they have chroma of 2 or 3 moist or dry. They are strongly acid to slightly acid.

The Bw horizon has value of 3 or 4 moist and 5 to 7 dry, and it has chroma of 2 to 6 moist or dry. It is gravelly loamy sand or gravelly sandy loam. It is moderately acid to neutral.

The 2Bw horizon has value of 4 or 5 moist and 6 or 7 dry, and it has chroma of 4 to 6 moist or dry. It is sandy loam, loam, or gravelly sandy loam. It is moderately acid to neutral.

The C horizon has value of 4 to 6 moist and 6 or 7 dry, and it has chroma of 4 to 8 moist or dry. It is stratified sand to gravelly loam with thin strata of loamy sand, sand, or weathered pumice. It is 10 to 25 percent pebbles and 15 to 40 percent soft pumice fragments. It is moderately acid to neutral. In some pedons extremely gravelly sand or weathered pumice is below a depth of 40 inches.

Zenker Series

The Zenker series consists of deep, well drained soils on mountainslopes. These soils formed in residuum and colluvium derived dominantly from sandstone. Slope is 30 to 90 percent. Elevation is 800 to 1,800 feet. The mean annual precipitation is 70 to 110 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 200 to 225 days.

These soils are classified as medial, mesic Typic Dystrandepts.

Typical pedon of Zenker silt loam, 65 to 90 percent slopes; about 8 miles southwest of Ryderwood; 500 feet south and 700 feet west of the northeast corner of sec. 16, T. 10 N., R. 4 W.

Oe—1 inch to 0; partially decomposed organic litter, including needles, leaves, twigs, bark chips, and roots; abrupt smooth boundary.

A—0 to 10 inches; dark brown (10YR 3/3) silt loam, yellowish brown (10YR 5/4) dry; weak fine granular structure; soft, very friable, nonsticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 20 percent subangular pebble- and cobble-sized

(as much as 10 centimeters in diameter) soft sandstone fragments and 10 percent shotlike aggregates 2 to 5 millimeters in diameter; moderately acid; clear wavy boundary.

BA—10 to 18 inches; dark yellowish brown (10YR 4/6) loam, brownish yellow (10YR 6/6) dry; moderate medium subangular blocky structure parting to moderate very fine granular; soft, very friable, nonsticky and slightly plastic, weakly smeary; many very fine, fine, medium, and coarse roots; many fine pores; 20 percent pebble- and cobble-sized (as much as 10 centimeters in diameter) soft sandstone fragments and 5 percent shotlike aggregates 2 to 5 millimeters in diameter; moderately acid; clear wavy boundary.

Bw—18 to 41 inches; dark yellowish brown (10YR 4/6) loam, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic, weakly smeary; many very fine roots and common fine, medium, and coarse roots; common fine pores; 45 percent subangular pebble- and cobble-sized (as much as 10 centimeters in diameter) soft sandstone fragments; strongly acid; abrupt irregular boundary.

Cr—41 to 45 inches; partially consolidated sandstone; cracks 2 to 5 inches apart.

Depth to bedrock is 40 to 60 inches. The particle-size control section is 20 to 27 percent clay. It is moderately acid to very strongly acid throughout.

The A horizon has value of 2 or 3 moist and 4 or 5 dry, and it has chroma of 2 or 3 moist and 2 to 4 dry. It is 0 to 35 percent soft sandstone fragments.

The BA horizon has value of 3 or 4 moist and 4 to 6 dry, and it has chroma of 3 to 6 moist or dry. It is loam or silt loam. It is 20 to 50 percent soft sandstone fragments.

The Bw horizon has value of 3 or 4 moist and 4 to 6 dry, and it has chroma of 3 to 6 moist or dry. It is loam or silt loam. It is 30 to 85 percent soft sandstone fragments, but it averages about 60 percent.

Zymer Series

The Zymer series consists of very deep, well drained soils on mountainslopes. These soils formed in residuum and colluvium derived from volcanic ash and basic igneous rock with a mantle of volcanic ash and some pumice. Slope is 30 to 90 percent. Elevation is 500 to 1,800 feet. The mean annual precipitation is 90 to 120 inches, the mean annual air temperature is about 49 degrees F, and the growing season is 150 to 200 days.

These soils are classified as ashy over loamy-skeletal, mixed, mesic Umbric Vitrandepts.

Typical pedon of Zymer sandy loam, 30 to 65 percent slopes; about 3 miles southwest of Cougar; 900 feet west and 700 feet north of the southeast corner of sec. 8, T. 6 N., R. 4 E.

Oi—1 inch to 0; leaves, needles, twigs, and moss; abrupt smooth boundary.

A—0 to 10 inches; very dark grayish brown (10YR 3/2) sandy loam (volcanic ash and cinders), brown (10YR 4/3) dry; moderate fine and medium granular structure; soft, very friable, slightly sticky and nonplastic; many very fine, fine, and medium roots; many fine irregular pores; 10 percent pumice fragments and 10 percent pebbles; slightly acid; clear wavy boundary.

Bw—10 to 20 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam (volcanic ash and cinders), yellowish brown (10YR 5/4) dry; moderate very fine and fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; many very fine, fine, and medium roots and common coarse roots; many fine irregular pores; 10 percent pumice fragments and 25 percent pebbles; moderately acid; clear wavy boundary.

2BC1—20 to 26 inches; dark yellowish brown (10YR 4/4) very gravelly loam, light yellowish brown (10YR 6/4) dry; weak very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine, fine, and medium roots and common coarse roots; many fine irregular pores; 15 percent pumice fragments and 40 percent pebbles; moderately acid; clear wavy boundary.

2BC2—26 to 34 inches; yellowish brown (10YR 5/6) extremely gravelly loam, brownish yellow (10YR 6/6) dry; weak very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; many very fine roots, common fine and medium roots, and few coarse roots; many fine irregular pores; 5 percent pumice fragments and 60 percent pebbles; moderately acid; clear wavy boundary.

2BC3—34 to 50 inches; strong brown (7.5YR 4/6) extremely gravelly loam, strong brown (7.5YR 5/6) dry; weak very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common very fine and fine roots and few medium roots; common fine irregular pores; 60 percent pebbles and 15 percent cobbles; strongly acid; gradual wavy boundary.

2C—50 to 60 inches; strong brown (7.5YR 4/6) extremely gravelly loam, strong brown (7.5YR 5/6)

dry; massive; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few very fine and fine roots; common fine irregular pores; 60 percent pebbles and 10 percent cobbles; strongly acid.

The umbric epipedon is 10 to 14 inches thick. The mantle of ash is 16 to 30 inches thick. The upper part of the particle-size control section is 5 to 25 percent pumice fragments and 0 to 10 percent pebbles, and the lower part is 35 to 80 percent rock fragments.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 moist and 4 or 5 dry, and chroma of 2 or 3 moist or dry. It is slightly acid or moderately acid.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5 moist and 5 to 7 dry, and chroma of 3 or 4 moist or dry. It is loamy sand, sandy loam, gravelly loamy sand, or gravelly sandy loam. It is moderately acid or strongly acid.

The 2BC and 2C horizons have hue of 10YR or 7.5YR, value of 4 or 5 moist and 5 to 7 dry, and chroma of 4 to 6 moist or dry. They are loam or clay loam. The horizons are 40 to 65 percent pebbles, 0 to 15 percent cobbles, and 0 to 5 percent stones. They are moderately acid or strongly acid.

Zynbar Series

The Zynbar series consists of very deep, well drained soils on mountainslopes. These soils formed in glaciofluvial deposits of volcanic ash and weathered andesite with a mantle of volcanic ash. Slope is 5 to 30 percent. Elevation is 1,800 to 2,800 feet. The mean annual precipitation is 70 to 100 inches, the mean annual air temperature is about 43 degrees F, and the growing season is 140 to 190 days.

These soils are classified as medial, frigid Entic Dystrandepts.

Typical pedon of Zynbar silt loam, 5 to 30 percent slopes; about 8 miles east of Toutle; 950 feet east and 2,300 feet south of the northwest corner of sec. 21, T. 10 N., R. 2 E.

Oi—1 inch to 0; leaves, needles, twigs, and moss; abrupt smooth boundary.

Ac—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic, weakly smeary; many very fine and fine roots, common medium roots, and few coarse roots; many fine pores; 15 percent shotlike aggregates; slightly acid; clear smooth boundary.

A—4 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, pale brown (10YR 6/3) dry; moderate very fine and fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic, weakly smeary; many very fine and fine roots, common medium roots, and few coarse roots; many fine pores; 10 percent shotlike aggregates; moderately acid; clear wavy boundary.

Bw1—9 to 16 inches; brown (10YR 4/3) gravelly silt loam, light yellowish brown (10YR 6/4) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; common very fine, fine, and medium roots and few coarse roots; many fine pores; 20 percent pebbles; moderately acid; gradual wavy boundary.

Bw2—16 to 32 inches; dark yellowish brown (10YR 4/4) gravelly silt loam, very pale brown (10YR 7/4) dry; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few very fine, fine, and medium roots; common fine pores; 20 percent pebbles; moderately acid; gradual wavy boundary.

Bw3—32 to 45 inches; dark yellowish brown (10YR 4/6) gravelly silt loam, very pale brown (10YR 7/4) dry; moderate medium and coarse angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic, weakly smeary; few very fine, fine, and medium roots; common fine pores; 20 percent pebbles; moderately acid; gradual wavy boundary.

BC—45 to 60 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; massive; hard, friable, slightly sticky and slightly plastic, weakly smeary; few very fine, fine, and medium roots; few fine pores; 10 percent pebbles; moderately acid.

The solum is 40 to 60 inches thick or more. The particle-size control section is 15 to 35 percent rock fragments.

The A horizon has value of 2 to 4 moist and 5 or 6 dry, and it has chroma of 2 or 3 moist or dry. It is neutral to moderately acid.

The Bw and BC horizons have hue of 5YR to 10YR, value of 4 or 5 moist and 6 or 7 dry, and chroma of 3 to 6 moist or dry. They are silt loam or loam. They are neutral to moderately acid.

Formation of the Soils

Soil is a natural three-dimensional body on the earth's surface. Its characteristics and properties have been determined by physical and chemical processes that result from the interaction of five soil-forming factors—parent material, climate, living organisms, topography, and time. The influence of any one of these factors varies from place to place, but the interaction of all the factors determines the kind of soil that forms. The soils in the survey area exhibit a wide variety of diagnostic features and horizons that relate directly to the unique set of soil-forming factors that characterize this area. In the following section, the soil-forming factors are described and their influence on the soils in the area is explained.

Parent Material

Parent material is a product of the weathering of rock. It is the unconsolidated material that underlies soils at various depths, and it can be identified by its geologic origin and mineral composition. The soils in the survey area formed in four different kinds of parent material—flow rock of basalt and andesite, volcanic tephra of ash and pumice, marine and nonmarine sedimentary rock, and mixed alluvial and colluvial material (Beaulieu 1971, Livingston 1966).

During the late Eocene and the Oligocene (24 to 40 million years ago), most of the area west of the Cascade Mountains was covered by the Pacific Ocean and it had a shallow-water fluctuating coastline. Alluvial sand and silt from the eroding, older part of the Cascade Mountains was deposited into this shallow water. These alluvial deposits were compressed and hardened over time to become sedimentary rock. Generally, the older rock is finer textured material (siltstone) and the younger rock is fine grained to coarse grained material (sandstone with some interbedded siltstone). In some areas closer to the older part of the Cascade Mountains, the sediment was deposited in fresh water and is characterized by thin beds of carbonaceous shale and coal. All of these layered marine and nonmarine deposits eventually became the basaltic and feldspathic sandstone and siltstone that are the parent material for most of the soils in general soil map units 5, 6, and 9 (Burroughs and others 1976, Swanston 1974).

As erosion of the older part of the Cascade Mountains was occurring during the middle to late Eocene and into the Oligocene, new volcanic eruptions were emitting flows of molten rock that eventually became the foothills and mountains of the present Cascade Mountains. The most prominent flows, which occurred during the late Eocene, are composed of extrusive basic igneous rock, mainly andesite and andesitic volcanic breccia and some basalt. Highly weathered tuff and basaltic conglomerate also occur in some areas. Slightly older nonmarine siltstone and sandstone are interbedded with the volcanic rock in a few areas. These formations are the source of the parent material for most of the soils in general soil map units 4, 8, 10, and 19.

During the early to middle Miocene, the Columbia River lava was extruded. Prior to that, erosion had reduced the lava nearly to base level. During the late Miocene and early Pliocene, the area was uplifted again and laterization of the Columbia River basalt began. This laterization continued until bauxite was formed. During the late Pliocene to early Pleistocene, the area was covered with windblown silt (loess). This silt and basalt make up the parent material for general soil map unit 7.

Deposition of tephra (deposits of volcanic ash and pumice) from the volcanoes of the Cascade Mountains has occurred at intervals throughout the geologic history of the survey area. The Eocene sandstone and siltstone of the western part of the survey area are composed in part of weathered tephra from ancient, long-absent volcanoes. Nearly all of the soils in the survey area have at least an admixture of ash or pumice fragments, or both.

Most of the upland soils have ash in the upper part. In the western part of the survey area, the ash is attributed mainly to the eruption of Mount Mazama 6,600 years ago, which resulted in the formation of Crater Lake in southern Oregon. The admixture of ash in the soils in general soil map units 4, 5, 6, 8, 10, and 14 probably is dominantly from Mount Mazama. The upland soils in the central and eastern parts of the survey area accumulated ash from numerous

eruptions of Mount Mazama and Mount St. Helens (Crandell and Mullineaux 1978). These eruptions formed the parent material for the soils in general soil map units 11, 12, 13, 15, 16, 18, 20, and 21.

Mount St. Helens has filled the surrounding valleys with lahar, pyroclastic flows, and alluvium interbedded with deposits of tephra in some areas (fig. 9). The soils in general soil map units 3 and 17 formed in this parent material.

Alluvial parent material consists of sediment that has been deposited along major and minor streams and drainageways. It is on the present flood plains and on terraces. It varies widely in texture because of the manner in which it was deposited and the nature of the material. In this survey area, the alluvium was derived from lacustrine sediment, material from the steep side slopes, and deposits from overflowing streams. The soils in general soil map units 1 and 2 formed in this alluvial material.

Climate

Climate is directly or indirectly responsible for variations in plant and animal life and for major differences in soils. Climate affects the weathering of rock and the removal and deposition of material by water, wind, and glaciers. It also affects the rate of percolation of water through soil.

The survey area has a marine climate. Summers are cool and dry, and winters are mild but wet and

Figure 9.—View of a mudflow that filled the Toutle River Valley. Mount St. Helens is in background.

cloudy. Rainfall is heavier and temperatures are lower at the higher elevations in the mountains than in the valleys. The gentle rain showers received in the survey area, however, moisten the soils much more effectively than do torrential downpours. The rainwater soaks into the soils and percolates downward. Because humidity is high in the survey area, the soils are highly leached. Most of the bases have been leached out of the soils; thus, they generally are acid.

Climate has a marked effect on the productivity and fertility of soils. Soils such as those of the Clato series have an average annual rainfall of about 50 inches and are generally more fertile than soils such as those of the Vanson series that receive about 100 inches of annual rainfall or more. At the higher elevations, the growing season is shorter, frost occurs later in spring and earlier in fall, and the average annual temperature is lower. Soils at the higher elevations are less productive than those at the lower elevations. For example, the Boistfort soils, which are at an elevation of less than 1,800 feet, produce about 181 cubic feet of Douglas fir per acre per year but the Murnen soils, which are similar to the Boistfort soils but are at an elevation of 1,800 to 2,500 feet, produce only about 139 cubic feet of Douglas fir per acre per year.

Living Organisms

All living matter on and in the soil contributes to soil formation. Plants, micro-organisms, animals, and man are active, ongoing forces that affect the development of soils. If moisture is available and the temperature is adequate, soil material is a medium in which simple forms of life develop and reproduce. New soils are invaded by bacteria and fungi. These micro-organisms grow, contribute nutrients to the soil, and convert organic residue into forms that can be used for continued growth. Over a long period of time, the organic matter is sufficient to permit a more fertile soil to develop. If the climate is suitable, material from mosses and lichens, grasses, forbs, ferns, shrubs, and trees is incorporated into these soils. In time, the soils become capable of supporting more kinds of vegetation and in greater volume. The plants and plant residue then produce an environment in which animals can thrive.

Plants incorporate nutrients from the atmosphere into the solum. Water absorbed by plant roots contains the dissolved minerals from the lower part of the soil and from the regolith. These minerals aid in plant growth. When organic matter from the plants decays, nutrients translocated by leaching are added to the solum. Plants play a key role in cycling nutrients, controlling movement of water in soils, and preventing loss of water and nutrients (Buckman and Brady 1969).

Litter from vegetation, including leaves, needles, twigs, bark, and cones, seasonally falls onto the surface of soils. Moisture, micro-organisms, and animals act to decompose the litter and mix it into the surface layer, where it is leached of nutrients by rainfall and snowmelt. Organic matter is the main source of nitrogen for plant growth. The decomposition of organic matter also produces organic acids that promote the leaching of nutrients from mineral soil material. Over a long period of time, organic matter can accumulate to a level that can be replenished annually or sustained continuously if the natural cycle is uninterrupted. An accumulation of organic matter in the surface layer commonly is indicated by black or very dark brown color. Soils that developed under the influence of grasses, forbs, and ferns for long periods of time have a very thick, black, fertile surface layer. A surface layer that is high in organic matter content tends to develop a soft, very friable structure typified by fine granules or subangular blocks. It has higher porosity and available water capacity than the underlying layers.

Roots penetrate soils, break up and mix soil layers, help to develop soil structure, and increase the porosity of soils. Decomposed roots, particularly the fine, very deep roots of grasses, contribute a considerable amount of organic matter to the solum. In forested areas, windthrow churns and mixes the soils, bringing the subsoil material to the surface.

Once plants have become established on a soil, they help to protect it from erosion. Leaves, needles, and branches of trees and shrubs mitigate the impact of rainfall. The organic litter on the surface of forested soils and the grasses and other plants in open areas help to hold rainwater in place and limit runoff. Roots help to hold in place soils that are saturated late in winter and early in spring, even on the steeper slopes.

Organic soils such as those of the Semiahmoo series and Histic Humaquepts formed in bogs in accumulations of the remains of water-tolerant plants such as sedges, rushes, and mosses. These accumulations consist of highly decomposed sapric material (muck), relatively fresh fibric material (peat), or hemic material (mucky peat). The extent to which this plant material is decomposed depends on the age of the organic material, the moisture and temperature conditions, and the aeration of the deposits.

Vast numbers of bacteria are present in soil, especially in the surface layer, where moisture, temperature, and aeration are most favorable. Bacteria

help to complete important enzymatic functions that are essential to soil development and fertility.

Molds and fungi are especially important in the development of acidic forested soils. Molds are more active in the formation of humus and the stabilization of soil aggregates than are bacteria. Fungi break down organic residue into forms that are available for plants. Mushroom fungi attach to and penetrate the roots of trees, thus establishing a symbiotic relationship. The trees receive nutrients from the fungi, and the fungi absorb carbohydrates from the roots of trees. Over a long period of time, this relationship enriches the soils and can be essential to soil development in areas that are relatively infertile.

Micro-organisms called actinomycetes also provide nutrients to plants and enrich soils. These organisms, for example, are responsible for the growth of nodules on the rootlets of red alder (Harlow and Harrar 1968). The nodules take free nitrogen from the air in the soil and convert it to forms that are available to plants. As a result, soils that support stands of red alder commonly are rich in nitrogen.

Animals, particularly earthworms and ants, contribute to the development of soil by helping to decompose organic matter and mixing the soil, moving organic residue down into the soil profile, and moving fresh mineral soil material closer to the surface, where it can be leached of nutrients. Their presence in the surface layer contributes to the development of soil structure and improves aeration. Mice, moles, and mountain beavers burrow into the soil, excavating tunnels deep into the subsoil and depositing soil material from at or near the surface. When the burrows are abandoned, they are filled with loose material from the surface layer that is rich in organic matter and with organic litter. Plant roots easily penetrate these soft, aerated deposits and grow rapidly, thus becoming established deeper in the soil than would otherwise be possible.

Man has altered forested soils primarily through the harvesting of timber. Logging operations mix the duff and forest debris with the surface layer. Clearcutting allows herbs, ferns, and shrubs to invade. The amount of organic matter contributed to the soil from these plants is higher and the kind of organic matter is different than that of forested areas that have not been clearcut.

Soils that support forests that have been cut commonly have a darker colored, thicker surface layer and generally are more neutral in reaction than those that support old-growth timber. Woody material and brush left from logging are disposed of by burning, which breaks down organic debris and releases nutrients that are leached into the soil. Carbon residue from the burns darkens the surface layer. Very hot burns can alter the structure and color of the surface layer and reduce its nutrient level.

Clearing debris with wheeled and tracked equipment redistributes surface soil material by scraping and gouging. Soils commonly are compacted and to some extent are displaced or puddled, or both, by logging and site preparation, thus altering soil structure, porosity, and permeability. In addition, areas that have been clearcut and areas where logging roads have been built across the slope are susceptible to erosion and mass wasting (slumps and landslides) that can greatly alter the landscape, deplete or destroy soils, and limit reforestation.

Soils of the Lytell, Swem, and Zenker series are examples of those that commonly are subject to mass wasting after logging. Following prescribed burns or forest fires, the surface layer of the soils on an entire slope can be removed by erosion, particularly sheet erosion. Erosion of barren soils generally removes soil material from the steep shoulder slopes and back slopes and deposits it in concave areas, on footslopes, and in basins and drainageways.

Soils that are used for cultivated crops, hay, and pasture commonly are at the lower elevations on terraces, plains, and bottom lands and are near waterways and population centers. Cultivation alters the nutrient status, structure, drainage, and erosion potential of the soils. The biological and chemical processes in soils are altered by introducing new crops, adding organic matter (plowing under cover crops or applying manure) and other fertilizers, applying amendments such as lime and sulfur, and irrigating. Soils that have been farmed for a long period of time have higher, more neutral reaction and higher base saturation than do forested soils. Farmed soils develop a soft, dark, very friable surface layer. Regular additions of fertilizer and other amendments commonly are needed in specific amounts to maintain productivity year after year. Soil aeration, color, and texture are altered by artificial drainage. Tillage over several years can result in development of a compacted layer, or pan, below the plow layer, which can alter drainage and permeability. Cultivation in the steeper areas and irrigation increase the risk of erosion from runoff.

Topography

Topography largely determines the amount of runoff and the risk of erosion, the stability of soil material, and soil drainage.

Runoff becomes more rapid as the steepness of slope increases. Consequently, geologic erosion from

steep slopes probably has contributed more to the parent material of soils on toeslopes, benches, valleys, and alluvial bottom lands than has erosion from broad, relatively flat plains, uplands, and ridges. Establishment of vegetation helps to stabilize soils on all slopes and thus minimizes the risk of erosion and increases the rate of development of a soil profile.

When soils are exposed as a result of clearcutting, road construction, forest fires, or farming, the potential for alteration by erosion increases. Erosion of barren areas is nearly always higher in steeper areas, although unprotected soils in undulating to rolling areas can be subject to severe losses during the rainy season or when the soils are saturated. Soil material may be moved only short distances, depleting hilltops and filling nearby swales. Sheet erosion mainly carries away surface layer material. Rill and gully erosion can cut into the subsoil and substratum. Mass wasting on steep slopes can remove all of the soil material above the regolith and deposit it downslope. Mass movement is common in much of the survey area.

Soils that formed in broad, nearly level to moderately sloping areas in this survey area typically are deeper, have fewer rock fragments (or the fragments are highly weathered), and are more developed than those on steep or colluvial side slopes. Soils on steep slopes are subject to soil creep. Soil creep prevents colluvial soils, such as those of the Baumgard and Schneider series, from developing a clay-rich subsoil and from weathering as rapidly or as deeply into the regolith as the associated, less steep soils, such as those of the Olympic series.

Bottom land soils formed in alluvium deposited by runoff water from surrounding uplands and from floodwater from adjacent streams and rivers that carried material into the valleys from higher lying areas.

Present conditions, such as the natural plant cover and the use, development, and alteration of the soils, are dependent on the length and incidence of seasonal flooding, in areas where the soils are not protected from overflow, and on the ability of the soils to allow excess water to drain away. Unprotected areas of the well drained Clato and Newberg soils are subject to only minor flooding in winter and early in spring; therefore, the fertility of the soils and the suitability of the soils for use as cropland are not seriously affected. Minor flooding can benefit the soils by adding nutrients and silty fines. Overland flow of water results in the deposition of some material, but it also carries away surface layer material and limits the kinds of natural vegetation that can grow.

The poorly drained Godfrey soils are subject to occasional periods of flooding. These soils are waterlogged much of the year and do not dry out until midsummer; thus, soil development is slower in these soils than in other soils. The natural vegetation consists mainly of wetland plants. The Semiahmoo and Snohomish soils are in depressional areas of flood plains or bottom lands, where drainage outlets are limited. Runoff is very slow or does not occur at all; thus, water on these soils becomes stagnant. These soils formed in the dead plant material that accumulated as peat and muck. They support mainly rushes and sedges.

Aerially deposited pumice and volcanic ash deposits from Mount St. Helens are deeper on slopes facing toward the volcano than on those facing away from it. The depth of the tephra is also dependent on the steepness of the slope. The more steeply sloping areas have been subject to more erosion from runoff and from dry ravel of pumice than have the less sloping areas.

Time

Time is unique among the factors of soil formation, because time by itself does not affect the formation of soils. Instead, time is a kind of multiplier of the effects of climate, vegetation and animals, and topography as they act on parent material and transform it into soil and as they continually transform the properties of soils. Over time parent material that initially was uniform will develop layers, or soil horizons. These horizons develop properties that reflect the rooting depth of plants and the downward movement of water and heat into the soil. Soils tend to develop more horizons and different types of characteristics in the horizons as the amount of time increases.

Many kinds of soil are in this survey area. The soils range from those that have only a C horizon to those that have an A, a B, and a C horizon. In many instances the degree of horizonation and the number of horizons can be related to the age of the soil. For example, the A horizon of a young soil typically is not so thick or dark as that of an older soil and the B horizon exhibits less accumulation of translocated clay or does not have an accumulation of clay.

The oldest glacial deposit in the survey area is the outwash of the Salkum soils (Weigle and Foxworthy 1962). This outwash was deposited 325,000 to 1.5 million years ago. Although it originally was coarse textured material (silt, sand, and hard, rounded pebbles and cobbles), the length of time it has been subject to weathering has resulted in the formation of

the clayey Salkum soils. The B horizon exhibits distinct and prominent, continuous clay films on the peds and lining the pores. The mineralogy of the clay fraction of these soils includes kaolinite, which is a clay that has undergone a very high degree of weathering. In the upper part of the profile, the rock commonly is completely weathered and is no longer recognizable. In the lower part, the rock is unconsolidated or very soft and even the hardest fragments can be easily cut with a knife.

The Mountsolo soils formed in the mudflows that occurred following the eruption of Mount St. Helens on May 18, 1980. The mudflows consist primarily of gravelly and very gravelly sand. The Mountsolo soils exhibit very little, if any, signs of weathering, although there is some red mottling in a few small areas. The soils do not exhibit translocation of clay or weathering of the underlying rock. They do not have a B horizon. The profile is entirely C horizon material that has very hard, rounded pebbles and cobbles throughout.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Andic soil properties. The physical and chemical soil properties that define the taxonomic criteria for the Andisol order in Soil Taxonomy.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Low	0 to 3.75
Moderate	3.75 to 7.50
High	more than 7.50

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Cirque. A semicircular, concave, bowllike area that has steep faces primarily resulting from glacial ice and snow abrasion.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes

resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Creep. Gradual downslope movement of soil material. It is caused by gravity but is facilitated by saturation of the material with water and by alternate freezing and thawing.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainage, surface. Runoff, or surface flow of water, from an area.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Foot slope. The inclined surface at the base of a hill.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a

gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates

the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Laterization. The chemical weathering of rock or soil that results in red soils or material that is rich in secondary oxides of iron or aluminum, or both, and is nearly devoid of bases and primary silicates.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4

is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour and micrometers per second, are as follows:

Very slow (0 to 0.4 micrometer)	0 to 0.06 inch
Slow (0.4 to 1.0 micrometer)	0.06 to 0.2 inch
Moderately slow (1 to 4 micrometers)	0.2 to 0.6 inch
Moderate (4 to 14 micrometers)	0.6 inch to 2.0 inches
Moderately rapid (14 to 42 micrometers)	2.0 to 6.0 inches
Rapid (42 to 141 micrometers)	6.0 to 20 inches
Very rapid (more than 141 micrometers)	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables). Pits caused by melting around ice. They form on the soil after plant cover is removed.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe **II**). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe **III**). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and

not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 3 percent
Gently sloping	1 to 8 percent
Strongly sloping	4 to 16 percent
Moderately steep	10 to 30 percent
Steep	20 to 60 percent
Very steep	45 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Talus. Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Tephra. A collective term for all clastic volcanic material that is ejected from a vent during an eruption and transported through the air. It includes ash, blocks, cinders, lapilli, scoria, and pumice.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

The tables in this survey give the properties and interpretations for the major components, which are given in the detailed soil map unit names. The properties and interpretations for the minor components, which are listed in the detailed soil map units, will be available in the National Soil Information System (NASIS) database for the survey area as the data fields are populated.

Table 1.--Temperature and Precipitation

(Recorded in the period 1951-1981 at Cougar and Longview, Washington)

Month	Temperature					Precipitation					
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	*Units*	*In*	*In*	*In*		*In*
COUGAR											
January-----	40.9	31.2	36.1	55	13	58	18.26	8.24	26.83	18	13.4
February----	46.3	34.2	40.3	63	21	81	14.19	8.60	19.20	16	5.5
March-------	50.2	35.0	42.6	71	25	125	11.94	6.85	16.46	16	1.6
April-------	55.9	38.1	47.0	79	30	219	7.95	5.16	10.48	13	0.1
May---------	64.0	43.4	53.7	89	34	425	4.94	2.95	6.72	10	0
June--------	71.0	49.3	60.2	94	38	606	3.77	1.55	5.64	6	0
July--------	78.0	52.3	65.2	101	41	781	1.36	0.25	2.25	3	0
August------	76.8	52.4	64.6	102	42	763	2.65	0.48	4.33	5	0
September---	70.8	49.6	60.2	93	39	606	4.56	1.29	7.19	7	0
October-----	61.2	44.1	52.7	82	34	394	9.11	4.37	13.20	12	0
November----	49.4	38.0	43.7	65	25	147	16.72	10.35	22.45	17	1.4
December----	42.8	33.8	38.3	56	19	55	20.93	13.83	27.39	19	5.7
Yearly:											
Average----	58.9	41.8	50.4	---	---	---	---	---	---	---	---
Extreme----	---	---	---	103	8	---	---	---	---	---	---
Total------	---	---	---	---	---	4,260	116.38	101.91	131.28	142	27.7

See footnote at end of table.

Table 1.--Temperature and Precipitation--Continued

Month	Temperature					Precipitation					
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	oF	*oF*	*oF*	*oF*	*oF*	*Units*	*In*	*In*	*In*		*In*
LONGVIEW											
January-----	44.9	32.9	38.9	58	13	103	6.79	3.20	9.87	15	3.2
February----	50.5	34.7	42.6	65	21	113	4.45	2.90	5.85	12	0.6
March-------	54.1	35.4	44.8	72	25	167	4.46	2.68	6.04	14	0.8
April-------	59.9	38.3	49.1	81	29	276	3.32	1.91	4.56	11	0
May---------	66.4	42.9	54.7	91	32	456	2.36	1.49	3.15	8	0
June--------	71.2	48.2	59.7	92	38	591	2.07	1.14	2.88	6	0
July--------	77.2	50.9	64.1	98	41	747	0.83	0.13	1.36	2	0
August------	77.3	51.3	64.3	99	41	753	1.54	0.26	2.50	4	0
September---	73.0	48.6	60.8	93	38	624	2.24	0.77	3.44	6	0
October-----	63.1	43.0	53.1	82	31	406	4.13	2.31	5.73	10	0
November----	52.3	37.6	45.0	68	22	169	6.24	3.49	8.66	14	0.3
December----	46.4	35.1	40.8	59	19	90	7.67	5.14	9.98	16	1.2
Yearly:											
Average----	61.4	41.6	51.5	---	---	---	---	---	---	---	---
Extreme----	---	---	---	101	10	---	---	---	---	---	---
Total------	---	---	---	---	---	4,495	46.10	40.31	51.67	118	6.1

*A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1951-1981 at Cougar and Longview, Washington)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
COUGAR			
Last freezing temperature in spring:			
1 year in 10 later than--	March 5	March 28	May 13
2 years in 10 later than--	February 20	March 15	May 5
5 years in 10 later than--	January 25	February 18	April 19
First freezing temperature in fall:			
1 year in 10 earlier than--	November 20	November 7	October 29
2 years in 10 earlier than--	December 1	November 18	November 5
5 years in 10 earlier than--	December 22	December 10	November 18
LONGVIEW			
Last freezing temperature in spring:			
1 year in 10 later than--	March 8	April 14	May 15
2 years in 10 later than--	February 25	April 3	May 7
5 years in 10 later than--	February 4	March 13	April 21
First freezing temperature in fall:			
1 year in 10 earlier than--	November 14	October 23	October 18
2 years in 10 earlier than--	November 24	November 4	October 24
5 years in 10 earlier than--	December 15	November 26	November 3

Table 3.--Growing Season

(Recorded in the period 1951-1981 at Cougar and Longview, Washington)

Probability	Daily minimum temperature during growing season		
	Higher than 24 ^{o}F	Higher than 28 ^{o}F	Higher than 32 ^{o}F
COUGAR			
9 years in 10	295	247	179
8 years in 10	304	263	191
5 years in 10	327	295	212
2 years in 10	>365	326	233
1 year in 10	>365	342	244
LONGVIEW			
9 years in 10	269	216	165
8 years in 10	285	230	175
5 years in 10	319	257	195
2 years in 10	>365	284	215
1 year in 10	>365	298	226

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
1	Andaquepts, 0 to 3 percent slopes	420	*
2	Andic Cryaquepts-Rock outcrop complex, 50 to 90 percent slopes	1,200	0.2
3	Andic Cryumbrepts-Rock outcrop complex, 50 to 90 percent slopes	2,810	0.4
4	Andic Cryumbrepts, overblown-Rock outcrop complex, 50 to 90 percent slopes	235	*
5	Arents, 0 to 5 percent slopes	725	*
6	Astoria silt loam, 5 to 30 percent slopes	840	0.1
7	Baumgard silt loam, 5 to 30 percent slopes	3,700	0.5
8	Baumgard silt loam, 30 to 65 percent slopes	10,950	1.5
9	Beigle silt loam, 5 to 30 percent slopes	6,030	0.8
10	Beigle silt loam, 30 to 65 percent slopes	4,085	0.6
11	Boistfort silt loam, 5 to 30 percent slopes	470	*
12	Buckpeak silt loam, 30 to 65 percent slopes	8,000	1.1
13	Buckpeak silt loam, 65 to 90 percent slopes	230	*
14	Bunker silt loam, 5 to 30 percent slopes	940	0.1
15	Bunker silt loam, 30 to 65 percent slopes	1,250	0.2
16	Camas cobbly loam, 0 to 3 percent slopes	480	*
17	Caples silty clay loam, 0 to 3 percent slopes	12,750	1.7
18	Carrolls sand, flooded, 0 to 2 percent slopes	245	*
19	Carrolls loamy sand, 0 to 2 percent slopes	1,517	0.2
20	Carrolls fine sandy loam, overwash, 0 to 1 percent slopes	130	*
21	Centralia silt loam, 0 to 8 percent slopes	810	0.1
22	Centralia silt loam, 8 to 20 percent slopes	4,700	0.6
23	Centralia silt loam, 20 to 30 percent slopes	17,500	2.4
24	Cinebar loamy sand, overblown, 5 to 30 percent slopes	570	*
25	Cinebar silt loam, 0 to 5 percent slopes	2,670	0.4
26	Cinebar silt loam, 5 to 20 percent slopes	13,250	1.8
27	Cinebar silt loam, 20 to 30 percent slopes	945	0.1
28	Cinebar silt loam, 30 to 65 percent slopes	1,665	0.2
29	Cinnamon sandy loam, 5 to 30 percent slopes	2,025	0.3
30	Cinnamon sandy loam, 30 to 65 percent slopes	2,000	0.3
31	Cinnamon sandy loam, 65 to 90 percent slopes	430	*
32	Clato silt loam, 0 to 3 percent slopes	6,095	0.8
33	Coweeman silt loam, 5 to 15 percent slopes	910	0.1
34	Coweeman silty clay loam, 3 to 30 percent slopes	2,930	0.4
35	Cowlitz very gravelly sand, 0 to 1 percent slopes	3,220	0.4
36	Cowlitz extremely gravelly sand, disturbed, 0 to 5 percent slopes	1,900	0.3
37	Cowlitz extremely gravelly sand, disturbed, 5 to 15 percent slopes	260	*
38	Cowlitz extremely gravelly sand, disturbed, 15 to 30 percent slopes	260	*
39	Delameter extremely gravelly loamy sand, 0 to 20 percent slopes	3,610	0.5
40	Dobbs gravelly silt loam, 5 to 30 percent slopes	1,020	0.1
41	Dobbs gravelly silt loam, 30 to 65 percent slopes	930	0.1
42	Domell loamy sand, overblown, 5 to 30 percent slopes	4,275	0.6
43	Domell sandy loam, 5 to 30 percent slopes	2,575	0.3
44	Domell sandy loam, 30 to 70 percent slopes	1,265	0.2
45	Domell stony sandy loam, 5 to 30 percent slopes	1,420	0.2
46	Domell stony sandy loam, 30 to 65 percent slopes	1,345	0.2
47	Edgewick silt loam, 0 to 3 percent slopes	1,310	0.2
48	Elkprairie loamy sand, 0 to 30 percent slopes	2,075	0.3
49	Elochoman silt loam, 5 to 30 percent slopes	205	*
50	Ferteg silt loam, 0 to 8 percent slopes	625	*
51	Ferteg silt loam, 8 to 30 percent slopes	1,880	0.3
52	Forsyth very cobbly loamy sand, 0 to 30 percent slopes	1,335	0.2
53	Forsyth very cobbly loamy sand, 50 to 90 percent slopes	225	*
54	Germany silt loam, 0 to 8 percent slopes	2,235	0.3
55	Germany silt loam, 8 to 20 percent slopes	4,260	0.6
56	Germany silt loam, 20 to 30 percent slopes	9,760	1.3
57	Germany silt loam, 30 to 65 percent slopes	2,700	0.4
58	Germany silt loam, tuff substratum, 8 to 20 percent slopes	1,745	0.2
59	Germany silt loam, tuff substratum, 20 to 30 percent slopes	3,265	0.4
60	Germany silt loam, tuff substratum, 30 to 65 percent slopes	1,525	0.2

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
61	Gobar silt loam, 5 to 30 percent slopes	3,540	0.5
62	Gobar silt loam, 30 to 65 percent slopes	18,710	2.5
63	Gobar silt loam, 65 to 90 percent slopes	1,250	0.2
64	Gobar silt loam, 5 to 45 percent slopes, dissected	700	*
65	Godfrey silt loam, 0 to 3 percent slopes	2,400	0.3
66	Greenwater loamy sand, 8 to 45 percent slopes	960	0.1
67	Greenwater loamy sand, overblown, 0 to 8 percent slopes	510	*
68	Greenwater gravelly loamy sand, 0 to 8 percent slopes	725	*
69	Greenwater fine sandy loam, 0 to 8 percent slopes	1,975	0.3
70	Hatchet loamy sand, overblown, 30 to 65 percent slopes	1,000	0.1
71	Hatchet loamy sand, overblown, 65 to 90 percent slopes	410	*
72	Hatchet very cobbly sandy loam, 30 to 65 percent slopes	1,415	0.2
73	Hatchet-Rock outcrop complex, 30 to 65 percent slopes	2,700	0.4
74	Hatchet-Rock outcrop complex, 65 to 90 percent slopes	3,430	0.5
75	Hatchet, overblown-Rock outcrop complex, 65 to 90 percent slopes	510	*
76	Hazeldell gravelly silt loam, 8 to 20 percent slopes	10,548	1.4
77	Hazeldell gravelly silt loam, 20 to 30 percent slopes	27,590	3.7
78	Hazeldell gravelly silt loam, 30 to 65 percent slopes	34,325	4.7
79	Hazeldell gravelly silt loam, tuff substratum, 5 to 30 percent slopes	525	*
80	Hazeldell gravelly silt loam, tuff substratum, 30 to 65 percent slopes	18,975	2.6
81	Histic Cryaquepts, 0 to 1 percent slopes	420	*
82	Histic Humaquepts, 0 to 3 percent slopes	185	*
83	Hoffstadt loamy sand, overblown, 5 to 30 percent slopes	1,325	0.2
84	Hoffstadt loamy sand, overblown, 30 to 70 percent slopes	1,565	0.2
85	Hoffstadt very gravelly sandy loam, 5 to 30 percent slopes	415	*
86	Hoffstadt very gravelly sandy loam, 30 to 65 percent slopes	6,125	0.8
87	Hoffstadt-Rock outcrop complex, 30 to 65 percent slopes	665	*
88	Hoffstadt-Rock outcrop complex, 65 to 90 percent slopes	3,490	0.5
89	Hoffstadt, overblown-Rock outcrop complex, 30 to 65 percent slopes	225	*
90	Hoffstadt, overblown-Rock outcrop complex, 65 to 90 percent slopes	425	*
91	Jonas silt loam, 5 to 30 percent slopes	2,675	0.4
92	Jonas silt loam, 30 to 65 percent slopes	2,735	0.4
93	Kalama gravelly loam, 8 to 15 percent slopes	370	*
94	Kalama gravelly loam, 15 to 30 percent slopes	1,125	0.2
95	Kalama gravelly loam, 30 to 60 percent slopes	710	*
96	Katula very cobbly loam, 30 to 65 percent slopes	290	*
97	Katula very cobbly loam, 65 to 90 percent slopes	565	*
98	Katula-Bunker complex, 30 to 65 percent slopes	1,285	0.2
99	Katula-Bunker complex, 65 to 90 percent slopes	1,675	0.2
100	Kelso silt loam, 0 to 8 percent slopes	2,980	0.4
101	Kelso silt loam, 8 to 15 percent slopes	1,770	0.2
102	Kelso silt loam, 15 to 30 percent slopes	2,315	0.3
103	Kelso silt loam, 30 to 50 percent slopes	815	0.1
104	Kosmos silt loam, 0 to 3 percent slopes	425	*
105	Lacamas silt loam, 0 to 6 percent slopes	510	*
106	Lates silt loam, 5 to 30 percent slopes	915	0.1
107	Lates silt loam, 30 to 65 percent slopes	2,690	0.4
108	Lates-Rock outcrop complex, 65 to 90 percent slopes	625	*
109	Lithic Haplumbrepts, 50 to 100 percent slopes	1,240	0.2
110	Lithic Umbric Vitrandepts, 0 to 15 percent slopes	1,150	0.2
111	Lonestar sand, 30 to 65 percent slopes	345	*
112	Lonestar loamy sand, overblown, 5 to 30 percent slopes	465	*
113	Lonestar loamy sand, overblown, 30 to 65 percent slopes	795	0.1
114	Lonestar loamy sand, overblown, 65 to 90 percent slopes	200	*
115	Lonestar sandy loam, 5 to 30 percent slopes	1,800	0.2
116	Lonestar sandy loam, 30 to 65 percent slopes	1,570	0.2
117	Lonestar sandy loam, 65 to 90 percent slopes	275	*
118	Lonestar sandy loam, tuff substratum, 5 to 30 percent slopes	775	0.1
119	Loper silt loam, 20 to 30 percent slopes	1,970	0.3
120	Loper silt loam, 30 to 65 percent slopes	5,125	0.7
121	Lytell silt loam, 5 to 30 percent slopes	435	*

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
122	Lytell silt loam, 30 to 75 percent slopes	1,875	0.3
123	Mart silt loam, 0 to 8 percent slopes	220	*
124	Mart silt loam, 8 to 20 percent slopes	1,300	0.2
125	Mart silt loam, 20 to 30 percent slopes	3,310	0.4
126	Mart silt loam, 30 to 65 percent slopes	1,740	0.2
127	Maytown silt loam, 0 to 3 percent slopes	1,260	0.2
128	Melbourne loam, 8 to 20 percent slopes	1,105	0.1
129	Melbourne loam, 20 to 30 percent slopes	1,830	0.2
130	Minniece silt loam, 0 to 8 percent slopes	1,820	0.2
131	Mountsolo gravelly sand, 0 to 1 percent slopes	1,030	0.1
132	Mulholland silt loam, 5 to 30 percent slopes	7,550	1.0
133	Murnen silt loam, 5 to 30 percent slopes	3,010	0.4
134	Natal silty clay loam, 0 to 4 percent slopes	1,405	0.2
135	Newaukum gravelly silt loam, tuff substratum, 8 to 30 percent slopes	425	*
136	Newaukum gravelly silt loam, tuff substratum, 30 to 65 percent slopes	3,255	0.4
137	Newaukum cobbly silt loam, 5 to 30 percent slopes	3,700	0.5
138	Newaukum cobbly silt loam, 30 to 65 percent slopes	5,335	0.7
139	Newaukum cobbly silt loam, 65 to 90 percent slopes	240	*
140	Newaukum-Rock outcrop complex, 15 to 65 percent slopes	1,305	0.2
141	Newberg fine sandy loam, 0 to 3 percent slopes	4,565	0.6
142	Olequa silt loam, 0 to 8 percent slopes	2,415	0.3
143	Olequa silt loam, 8 to 20 percent slopes	1,120	0.2
144	Olequa silt loam, 20 to 30 percent slopes	1,330	0.2
145	Olequa silt loam, 30 to 65 percent slopes	1,285	0.2
146	Olympic silt loam, 2 to 8 percent slopes	5,875	0.8
147	Olympic silt loam, 8 to 20 percent slopes	40,075	5.4
148	Olympic silt loam, 20 to 30 percent slopes	19,900	2.7
149	Olympic silt loam, 30 to 65 percent slopes	1,960	0.3
150	Olympic silt loam, tuff substratum, 5 to 30 percent slopes	16,675	2.3
151	Panamaker gravelly sand, 0 to 3 percent slopes	950	0.1
152	Panamaker gravelly sand, flooded, 0 to 1 percent slopes	445	*
153	Pheeney gravelly silt loam, 5 to 30 percent slopes	1,565	0.2
154	Pheeney gravelly silt loam, 30 to 65 percent slopes	6,065	0.8
155	Pheeney gravelly silt loam, 65 to 90 percent slopes	1,400	0.2
156	Pheeney-Beigle complex, 5 to 30 percent slopes	10,540	1.4
157	Pheeney-Beigle complex, 30 to 65 percent slopes	19,850	2.7
158	Pheeney-Rock outcrop complex, 30 to 65 percent slopes	4,175	0.6
159	Pheeney-Rock outcrop complex, 65 to 90 percent slopes	2,840	0.4
160	Pilchuck loamy fine sand, 0 to 8 percent slopes	4,025	0.5
161	Pits	425	*
162	Polepatch loamy sand, overblown, 0 to 30 percent slopes	220	*
163	Polepatch very cobbly loamy sand, 0 to 30 percent slopes	350	*
164	Polepatch very cobbly loamy sand, 50 to 90 percent slopes	555	*
165	Polepatch extremely bouldery loamy sand, 0 to 30 percent slopes	1,750	0.2
166	Prather silty clay loam, 0 to 5 percent slopes	1,015	0.1
167	Prather silty clay loam, 5 to 15 percent slopes	320	*
168	Raught silt loam, 20 to 30 percent slopes	255	*
169	Raught silt loam, 30 to 65 percent slopes	920	0.1
170	Raught silt loam, 65 to 90 percent slopes	485	*
171	Reichel silt loam, 5 to 30 percent slopes	1,290	0.2
172	Riverwash	6,970	0.9
173	Rock outcrop-Rubble land complex	980	0.1
174	Rose Valley silt loam, 0 to 8 percent slopes	1,130	0.2
175	Rose Valley silt loam, 8 to 15 percent slopes	1,000	0.1
176	Salkum silt loam, 2 to 8 percent slopes	1,305	0.2
177	Salkum silt loam, 8 to 20 percent slopes	455	*
178	Salkum silt loam, 20 to 30 percent slopes	775	0.1
179	Sara silt loam, 0 to 8 percent slopes	2,350	0.3
180	Sara silt loam, 8 to 15 percent slopes	2,000	0.3
181	Sara silt loam, 15 to 40 percent slopes	2,430	0.3
182	Sara silty clay loam, 0 to 8 percent slopes	710	*

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
183	Sarazan very gravelly silt loam, 5 to 30 percent slopes	1,780	0.2
184	Sarazan very gravelly silt loam, 30 to 65 percent slopes	1,850	0.3
185	Sauvola loam, 0 to 8 percent slopes	1,010	0.1
186	Sauvola loam, 8 to 15 percent slopes	1,455	0.2
187	Sauvola loam, 15 to 30 percent slopes	2,200	0.3
188	Schneider very gravelly loam, 5 to 30 percent slopes	395	*
189	Schneider very gravelly loam, 30 to 65 percent slopes	3,135	0.4
190	Schneider-Rock outcrop complex, 15 to 65 percent slopes	1,660	0.2
191	Schneider-Rock outcrop complex, 65 to 90 percent slopes	5,345	0.7
192	Seaquest silt loam, 0 to 8 percent slopes	4,600	0.6
193	Seaquest silt loam, 8 to 20 percent slopes	5,930	0.8
194	Seaquest silt loam, 20 to 30 percent slopes	1,215	0.2
195	Semiahmoo muck, 0 to 1 percent slopes	1,425	0.2
196	Siouxon very cobbly silt loam, 5 to 30 percent slopes	1,475	0.2
197	Siouxon very cobbly silt loam, 30 to 65 percent slopes	6,875	0.9
198	Siouxon-Rock outcrop complex, 65 to 90 percent slopes	4,185	0.6
199	Snohomish silty clay loam, 0 to 1 percent slopes	1,500	0.2
200	Solo gravelly loamy sand, 0 to 8 percent slopes	1,760	0.2
201	Speelyai gravelly loamy sand, 0 to 8 percent slopes	2,050	0.3
202	Speelyai gravelly loamy sand, 15 to 60 percent slopes	210	*
203	Spodic Cryopsamments, 0 to 30 percent slopes	305	*
204	Stahl very gravelly silt loam, 30 to 65 percent slopes	825	0.1
205	Stahl-Reichel complex, 5 to 30 percent slopes	1,570	0.2
206	Stahl-Reichel complex, 30 to 65 percent slopes	610	*
207	Stahl-Rock outcrop complex, 30 to 75 percent slopes	525	*
208	Stella silt loam, 3 to 8 percent slopes	640	*
209	Stella silt loam, 8 to 15 percent slopes	405	*
210	Stella silt loam, 15 to 30 percent slopes	520	*
211	Studebaker very gravelly loamy sand, 0 to 20 percent slopes	2,000	0.3
212	Swem cobbly silt loam, 5 to 30 percent slopes	3,100	0.4
213	Swem cobbly silt loam, 30 to 65 percent slopes	715	*
214	Swift loamy sand, overblown, 30 to 65 percent slopes	195	*
215	Swift loamy sand, overblown, 65 to 90 percent slopes	235	*
216	Swift sandy loam, 5 to 30 percent slopes	1,410	0.2
217	Swift sandy loam, 30 to 65 percent slopes	8,100	1.1
218	Swift sandy loam, 65 to 90 percent slopes	455	*
219	Swift-Rock outcrop complex, 30 to 65 percent slopes	1,425	0.2
220	Swift-Rock outcrop complex, 65 to 90 percent slopes	3,970	0.5
221	Swift, overblown-Rock outcrop complex, 40 to 90 percent slopes	205	*
222	Vader loam, 5 to 30 percent slopes	490	*
223	Vader loam, 30 to 65 percent slopes	555	*
224	Vanson loamy sand, overblown, 5 to 30 percent slopes	1,465	0.2
225	Vanson loamy sand, overblown, 30 to 65 percent slopes	3,520	0.5
226	Vanson loamy sand, overblown, 65 to 90 percent slopes	1,020	0.1
227	Vanson loamy sand, till substratum, overblown, 5 to 30 percent slopes	805	0.1
228	Vanson loamy sand, till substratum, overblown, 30 to 65 percent slopes	1,570	0.2
229	Vanson sandy loam, 5 to 30 percent slopes	3,440	0.5
230	Vanson sandy loam, 30 to 65 percent slopes	4,995	0.7
231	Vanson sandy loam, 65 to 90 percent slopes	805	0.1
232	Vanson sandy loam, tuff substratum, 5 to 30 percent slopes	1,970	0.3
233	Vanson sandy loam, tuff substratum, 30 to 65 percent slopes	1,640	0.2
234	Vanson cobbly sandy loam, till substratum, 5 to 30 percent slopes	160	*
235	Vanson cobbly sandy loam, till substratum, 30 to 65 percent slopes	130	*
236	Vanson-Hatchet loamy sands, overblown, 5 to 30 percent slopes	1,520	0.2
237	Vanson-Hatchet loamy sands, overblown, 30 to 65 percent slopes	2,460	0.3
238	Vanson-Hatchet loamy sands, overblown, 65 to 90 percent slopes	995	0.1
239	Vanson-Hatchet complex, 5 to 30 percent slopes	2,715	0.4
240	Vanson-Hatchet complex, 30 to 65 percent slopes	7,550	1.0
241	Vanson-Hatchet complex, 65 to 90 percent slopes	1,675	0.2
242	Vanson-Rock outcrop complex, 30 to 65 percent slopes	1,480	0.2
243	Vanson-Rock outcrop complex, 65 to 90 percent slopes	3,550	0.5

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
244	Vanson, overblown-Rock outcrop complex, 30 to 65 percent slopes	560	*
245	Vanson, overblown-Rock outcrop complex, 65 to 90 percent slopes	940	0.1
246	Voight silt loam, 5 to 30 percent slopes	2,720	0.4
247	Winston silt loam, 0 to 8 percent slopes	1,070	0.1
248	Wyant loam, 5 to 30 percent slopes	2,255	0.3
249	Wyant loam, 30 to 65 percent slopes	780	0.1
250	Xana loamy sand, 5 to 30 percent slopes	405	*
251	Xana loamy sand, 30 to 65 percent slopes	385	*
252	Xeno silt loam, 5 to 30 percent slopes	4,210	0.6
253	Xeno silt loam, 30 to 65 percent slopes	4,100	0.6
254	Xerorthents, 50 to 90 percent slopes	990	0.1
255	Yalelake sandy loam, 5 to 30 percent slopes	2,190	0.3
256	Yalelake sandy loam, 30 to 65 percent slopes	2,160	0.3
257	Yalelake sandy loam, 65 to 90 percent slopes	555	*
258	Zenker silt loam, 30 to 65 percent slopes	1,325	0.2
259	Zenker silt loam, 65 to 90 percent slopes	2,045	0.3
260	Zymer sandy loam, 30 to 65 percent slopes	2,475	0.3
261	Zymer-Rock outcrop complex, 65 to 90 percent slopes	2,050	0.3
262	Zynbar silt loam, 5 to 30 percent slopes	2,240	0.3
263	Water	9,991	1.4
	Total	738,071	100.0

* Less than 0.1 percent.

Table 5.--Land Capability and Yields per Acre of Nonirrigated Crops and Pasture

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Land capability	Corn silage	Sweet corn	Grass-legume hay	Pasture	Winter wheat
		Tons	*Tons*	*Tons*	*AUM*	*Bu*
1:						
Andaquepts	6w	---	---	---	---	---
2:						
Andic Cryaquepts	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
3:						
Andic Cryumbrepts	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
4:						
Andic Cryumbrepts	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
5:						
Arents	4s	---	---	---	---	---
6:						
Astoria	4e	---	---	4.00	9.00	---
7:						
Baumgard	4e	---	---	3.50	8.00	---
8:						
Baumgard	6e	---	---	---	---	---
9:						
Beigle	4e	---	---	---	---	---
10:						
Beigle	7e	---	---	---	---	---
11:						
Boistfort	4e	---	---	3.50	8.00	---
12:						
Buckpeak	7e	---	---	---	---	---
13:						
Buckpeak	7e	---	---	---	---	---
14:						
Bunker	4e	---	---	3.00	7.00	---
15:						
Bunker	7e	---	---	---	---	---
16:						
Camas	4s	---	---	1.50	3.00	---
17:						
Caples	3w	25.00	---	5.00	11.00	90.00

Table 5.--Land Capability and Yields per Acre of Nonirrigated Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn silage	Sweet corn	Grass-legume hay	Pasture	Winter wheat
		Tons	*Tons*	*Tons*	*AUM*	*Bu*
18:						
Carrolls	5w	---	---	---	---	---
19:						
Carrolls	5w	---	---	---	---	---
20:						
Carrolls	5w	---	---	---	---	---
21:						
Centralia	2e	25.00	---	5.00	11.00	90.00
22:						
Centralia	3e	---	---	5.00	11.00	90.00
23:						
Centralia	4e	---	---	3.50	8.00	---
24:						
Cinebar	4e	---	---	---	---	---
25:						
Cinebar	2e	20.00	---	4.50	10.00	80.00
26:						
Cinebar	3e	---	---	4.50	10.00	80.00
27:						
Cinebar	4e	---	---	4.00	9.00	---
28:						
Cinebar	7e	---	---	---	---	---
29:						
Cinnamon	4e	---	---	---	---	---
30:						
Cinnamon	7e	---	---	---	---	---
31:						
Cinnamon	7e	---	---	---	---	---
32:						
Clato	1	25.00	5.00	5.00	11.00	90.00
33:						
Coweeman	4w	---	---	3.50	8.00	---
34:						
Coweeman	4e	---	---	3.50	8.00	---
35:						
Cowlitz	4s	---	---	---	---	---
36:						
Cowlitz	6s	---	---	---	---	---
37:						
Cowlitz	6s	---	---	---	---	---
38:						
Cowlitz	6s	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Nonirrigated Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn silage	Sweet corn	Grass-legume hay	Pasture	Winter wheat
		Tons	*Tons*	*Tons*	*AUM*	*Bu*
39:						
Delameter	6s	---	---	---	---	---
40:						
Dobbs	4e	---	---	---	---	---
41:						
Dobbs	7e	---	---	---	---	---
42:						
Domell	4e	---	---	---	---	---
43:						
Domell	4e	---	---	---	---	---
44:						
Domell	7e	---	---	---	---	---
45:						
Domell	6e	---	---	---	---	---
46:						
Domell	7e	---	---	---	---	---
47:						
Edgewick	3w	20.00	---	5.00	11.00	90.00
48:						
Elkprairie	6e	---	---	---	---	---
49:						
Elochoman	4e	---	---	---	---	---
50:						
Ferteg	2e	---	---	3.50	8.00	---
51:						
Ferteg	4e	---	---	3.50	8.00	---
52:						
Forsyth	6s	---	---	---	---	---
53:						
Forsyth	7e	---	---	---	---	---
54:						
Germany	2e	---	---	4.00	9.00	80.00
55:						
Germany	3e	---	---	3.50	8.00	75.00
56:						
Germany	4e	---	---	3.50	8.00	---
57:						
Germany	7e	---	---	---	---	---
58:						
Germany	3e	---	---	3.50	8.00	---
59:						
Germany	4e	---	---	3.50	8.00	---

Table 5.--Land Capability and Yields per Acre of Nonirrigated Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn silage	Sweet corn	Grass-legume hay	Pasture	Winter wheat
		Tons	*Tons*	*Tons*	*AUM*	*Bu*
60:						
Germany------------	7e	---	---	---	---	---
61:						
Gobar--------------	4e	---	---	3.50	8.00	---
62:						
Gobar--------------	7e	---	---	---	---	---
63:						
Gobar--------------	7e	---	---	---	---	---
64:						
Gobar--------------	4e	---	---	---	---	---
65:						
Godfrey------------	5w	---	---	2.00	4.00	---
66:						
Greenwater---------	4e	---	---	2.50	6.00	---
67:						
Greenwater---------	3s	---	---	---	---	---
68:						
Greenwater---------	3s	---	---	2.50	6.00	---
69:						
Greenwater---------	3s	---	---	2.50	6.00	---
70:						
Hatchet------------	7e	---	---	---	---	---
71:						
Hatchet------------	7e	---	---	---	---	---
72:						
Hatchet------------	7e	---	---	---	---	---
73:						
Hatchet------------	7e	---	---	---	---	---
Rock outcrop-------	8s	---	---	---	---	---
74:						
Hatchet------------	7e	---	---	---	---	---
Rock outcrop-------	8s	---	---	---	---	---
75:						
Hatchet------------	7e	---	---	---	---	---
Rock outcrop-------	8s	---	---	---	---	---
76:						
Hazeldell----------	3e	---	---	4.00	9.00	80.00
77:						
Hazeldell----------	4e	---	---	3.50	8.00	---
78:						
Hazeldell----------	7e	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Nonirrigated Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn silage	Sweet corn	Grass-legume hay	Pasture	Winter wheat
		Tons	*Tons*	*Tons*	*AUM*	*Bu*
79:						
Hazeldell----------	4e	---	---	4.00	9.00	---
80:						
Hazeldell----------	7e	---	---	---	---	---
81:						
Histic Cryaquepts--	6w	---	---	---	---	---
82:						
Histic Humaquepts--	5w	---	---	---	---	---
83:						
Hoffstadt----------	4e	---	---	---	---	---
84:						
Hoffstadt----------	7e	---	---	---	---	---
85:						
Hoffstadt----------	4e	---	---	---	---	---
86:						
Hoffstadt----------	7e	---	---	---	---	---
87:						
Hoffstadt----------	7e	---	---	---	---	---
Rock outcrop-------	8s	---	---	---	---	---
88:						
Hoffstadt----------	7e	---	---	---	---	---
Rock outcrop-------	8s	---	---	---	---	---
89:						
Hoffstadt----------	7e	---	---	---	---	---
Rock outcrop-------	8s	---	---	---	---	---
90:						
Hoffstadt----------	7e	---	---	---	---	---
Rock outcrop-------	8s	---	---	---	---	---
91:						
Jonas--------------	4e	---	---	---	---	---
92:						
Jonas--------------	7e	---	---	---	---	---
93:						
Kalama-------------	3e	---	---	4.00	9.00	80.00
94:						
Kalama-------------	4e	---	---	4.00	9.00	---
95:						
Kalama-------------	7e	---	---	---	---	---
96:						
Katula-------------	7e	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Nonirrigated Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn silage	Sweet corn	Grass-legume hay	Pasture	Winter wheat
		Tons	*Tons*	*Tons*	*AUM*	*Bu*
97:						
Katula	7e	---	---	---	---	---
98:						
Katula	7e	---	---	---	---	---
Bunker	7e	---	---	---	---	---
99:						
Katula	7e	---	---	---	---	---
Bunker	7e	---	---	---	---	---
100:						
Kelso	2e	20.00	---	4.00	9.00	80.00
101:						
Kelso	3e	---	---	4.00	9.00	80.00
102:						
Kelso	4e	---	---	4.00	9.00	---
103:						
Kelso	7e	---	---	---	---	---
104:						
Kosmos	5w	---	---	3.00	7.00	---
105:						
Lacamas	6w	---	---	3.00	7.00	---
106:						
Lates	4e	---	---	---	---	---
107:						
Lates	7e	---	---	---	---	---
108:						
Lates	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
109:						
Lithic Haplumbrepts	7e	---	---	---	---	---
110:						
Lithic Umbric Vitrandepts	7s	---	---	---	---	---
111:						
Lonestar	7e	---	---	---	---	---
112:						
Lonestar	6e	---	---	---	---	---
113:						
Lonestar	7e	---	---	---	---	---
114:						
Lonestar	7e	---	---	---	---	---
115:						
Lonestar	6e	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Nonirrigated Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn silage	Sweet corn	Grass-legume hay	Pasture	Winter wheat
		Tons	*Tons*	*Tons*	*AUM*	*Bu*
116:						
Lonestar-----------	7e	---	---	---	---	---
117:						
Lonestar-----------	7e	---	---	---	---	---
118:						
Lonestar-----------	6e	---	---	---	---	---
119:						
Loper--------------	4e	---	---	---	---	---
120:						
Loper--------------	7e	---	---	---	---	---
121:						
Lytell-------------	4e	---	---	---	---	---
122:						
Lytell-------------	7e	---	---	---	---	---
123:						
Mart---------------	2e	---	---	4.00	9.00	80.00
124:						
Mart---------------	3e	---	---	4.00	9.00	80.00
125:						
Mart---------------	4e	---	---	3.50	8.00	---
126:						
Mart---------------	7e	---	---	---	---	---
127:						
Maytown------------	3w	---	---	5.00	11.00	90.00
128:						
Melbourne----------	3e	---	---	4.50	10.00	85.00
129:						
Melbourne----------	4e	---	---	4.00	9.00	---
130:						
Minniece-----------	6w	---	---	3.00	7.00	---
131:						
Mountsolo----------	5w	---	---	---	---	---
132:						
Mulholland---------	4e	---	---	---	---	---
133:						
Murnen-------------	4e	---	---	---	---	---
134:						
Natal--------------	5w	---	---	3.00	7.00	---
135:						
Newaukum-----------	4e	---	---	3.50	8.00	---
136:						
Newaukum-----------	7e	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Nonirrigated Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn silage	Sweet corn	Grass-legume hay	Pasture	Winter wheat
		Tons	*Tons*	*Tons*	*AUM*	*Bu*
137:						
Newaukum-----------	4e	---	---	3.50	8.00	---
138:						
Newaukum-----------	7e	---	---	---	---	---
139:						
Newaukum-----------	7e	---	---	---	---	---
140:						
Newaukum-----------	7e	---	---	---	---	---
Rock outcrop-------	8s	---	---	---	---	---
141:						
Newberg------------	3w	25.00	2.50	5.00	11.00	90.00
142:						
Olequa-------------	2e	20.00	---	4.50	10.00	85.00
143:						
Olequa-------------	3e	---	---	4.50	10.00	80.00
144:						
Olequa-------------	4e	---	---	4.00	9.00	---
145:						
Olequa-------------	7e	---	---	---	---	---
146:						
Olympic------------	2e	20.00	---	4.00	9.00	80.00
147:						
Olympic------------	3e	---	---	4.00	9.00	80.00
148:						
Olympic------------	4e	---	---	3.50	8.00	---
149:						
Olympic------------	7e	---	---	---	---	---
150:						
Olympic------------	4e	---	---	4.00	9.00	80.00
151:						
Panamaker----------	4s	---	---	---	---	---
152:						
Panamaker----------	3w	---	---	---	---	---
153:						
Pheeney------------	4e	---	---	---	---	---
154:						
Pheeney------------	7e	---	---	---	---	---
155:						
Pheeney------------	7e	---	---	---	---	---
156:						
Pheeney------------	4e	---	---	---	---	---
Beigle-------------	4e	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Nonirrigated Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn silage	Sweet corn	Grass-legume hay	Pasture	Winter wheat
		Tons	*Tons*	*Tons*	*AUM*	*Bu*
157:						
Pheeney------------	7e	---	---	---	---	---
Beigle-------------	7e	---	---	---	---	---
158:						
Pheeney------------	7e	---	---	---	---	---
Rock outcrop-------	8s	---	---	---	---	---
159:						
Pheeney------------	7e	---	---	---	---	---
Rock outcrop-------	8s	---	---	---	---	---
160:						
Pilchuck-----------	4s	---	---	1.50	3.00	---
161:						
Pits---------------	8s	---	---	---	---	---
162:						
Polepatch----------	6e	---	---	---	---	---
163:						
Polepatch----------	6s	---	---	---	---	---
164:						
Polepatch----------	7e	---	---	---	---	---
165:						
Polepatch----------	6s	---	---	---	---	---
166:						
Prather------------	3w	15.00	---	3.50	8.00	75.00
167:						
Prather------------	3e	---	---	3.50	8.00	75.00
168:						
Raught-------------	4e	---	---	---	---	---
169:						
Raught-------------	7e	---	---	---	---	---
170:						
Raught-------------	7e	---	---	---	---	---
171:						
Reichel------------	6e	---	---	---	---	---
172:						
Riverwash----------	8w	---	---	---	---	---
173:						
Rock outcrop-------	8s	---	---	---	---	---
Rubble land--------	8s	---	---	---	---	---
174:						
Rose Valley--------	4w	---	---	3.50	8.00	---

Table 5.--Land Capability and Yields per Acre of Nonirrigated Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn silage	Sweet corn	Grass-legume hay	Pasture	Winter wheat
		Tons	*Tons*	*Tons*	*AUM*	*Bu*
175:						
Rose Valley--------	4w	---	---	3.50	8.00	---
176:						
Salkum-------------	2e	20.00	---	4.00	9.00	80.00
177:						
Salkum-------------	3e	---	---	4.00	9.00	80.00
178:						
Salkum-------------	4e	---	---	3.50	8.00	---
179:						
Sara---------------	4w	---	---	3.50	8.00	75.00
180:						
Sara---------------	4w	---	---	3.50	8.00	75.00
181:						
Sara---------------	4e	---	---	3.00	7.00	---
182:						
Sara---------------	4w	---	---	3.50	8.00	75.00
183:						
Sarazan------------	4e	---	---	---	---	---
184:						
Sarazan------------	7e	---	---	---	---	---
185:						
Sauvola------------	3w	15.00	5.00	3.50	8.00	75.00
186:						
Sauvola------------	3e	---	---	3.50	8.00	75.00
187:						
Sauvola------------	4e	---	---	3.00	7.00	---
188:						
Schneider----------	4e	---	---	---	---	---
189:						
Schneider----------	7e	---	---	---	---	---
190:						
Schneider----------	7e	---	---	---	---	---
Rock outcrop-------	8s	---	---	---	---	---
191:						
Schneider----------	7e	---	---	---	---	---
Rock outcrop-------	8s	---	---	---	---	---
192:						
Seaquest-----------	2e	20.00	---	4.00	9.00	80.00
193:						
Seaquest-----------	3e	---	---	4.00	9.00	80.00
194:						
Seaquest-----------	4e	---	---	3.50	8.00	---

Table 5.--Land Capability and Yields per Acre of Nonirrigated Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn silage	Sweet corn	Grass-legume hay	Pasture	Winter wheat
		Tons	*Tons*	*Tons*	*AUM*	*Bu*
195:						
Semiahmoo	5w	---	---	---	---	---
196:						
Siouxon	6s	---	---	---	---	---
197:						
Siouxon	7e	---	---	---	---	---
198:						
Siouxon	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
199:						
Snohomish	4w	24.00	6.00	6.00	13.00	80.00
200:						
Solo	4s	---	---	---	---	---
201:						
Speelyai	6w	---	---	1.50	3.00	---
202:						
Speelyai	6e	---	---	---	---	---
203:						
Spodic Cryopsamments	6e	---	---	---	---	---
204:						
Stahl	7e	---	---	---	---	---
205:						
Stahl	6e	---	---	---	---	---
Reichel	6e	---	---	---	---	---
206:						
Stahl	7e	---	---	---	---	---
Reichel	7e	---	---	---	---	---
207:						
Stahl	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
208:						
Stella	3w	---	---	4.00	9.00	80.00
209:						
Stella	3e	---	---	4.00	9.00	80.00
210:						
Stella	4e	---	---	4.00	9.00	---
211:						
Studebaker	6s	---	---	---	---	---
212:						
Swem	4e	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Nonirrigated Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn silage	Sweet corn	Grass-legume hay	Pasture	Winter wheat
		Tons	*Tons*	*Tons*	*AUM*	*Bu*
213:						
Swem	7e	---	---	---	---	---
214:						
Swift	7e	---	---	---	---	---
215:						
Swift	7e	---	---	---	---	---
216:						
Swift	4e	---	---	---	---	---
217:						
Swift	7e	---	---	---	---	---
218:						
Swift	7e	---	---	---	---	---
219:						
Swift	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
220:						
Swift	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
221:						
Swift	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
222:						
Vader	4e	---	---	---	---	---
223:						
Vader	7e	---	---	---	---	---
224:						
Vanson	6e	---	---	---	---	---
225:						
Vanson	7e	---	---	---	---	---
226:						
Vanson	7e	---	---	---	---	---
227:						
Vanson	6e	---	---	---	---	---
228:						
Vanson	7e	---	---	---	---	---
229:						
Vanson	6e	---	---	---	---	---
230:						
Vanson	7e	---	---	---	---	---
231:						
Vanson	7e	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Nonirrigated Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn silage	Sweet corn	Grass-legume hay	Pasture	Winter wheat
		Tons	*Tons*	*Tons*	*AUM*	*Bu*
232:						
Vanson	6e	---	---	---	---	---
233:						
Vanson	7e	---	---	---	---	---
234:						
Vanson	6e	---	---	---	---	---
235:						
Vanson	7e	---	---	---	---	---
236:						
Vanson	6e	---	---	---	---	---
Hatchet	6e	---	---	---	---	---
237:						
Vanson	7e	---	---	---	---	---
Hatchet	7e	---	---	---	---	---
238:						
Vanson	7e	---	---	---	---	---
Hatchet	7e	---	---	---	---	---
239:						
Vanson	6e	---	---	---	---	---
Hatchet	6s	---	---	---	---	---
240:						
Vanson	7e	---	---	---	---	---
Hatchet	7e	---	---	---	---	---
241:						
Vanson	7e	---	---	---	---	---
Hatchet	7e	---	---	---	---	---
242:						
Vanson	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
243:						
Vanson	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
244:						
Vanson	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
245:						
Vanson	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Nonirrigated Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn silage	Sweet corn	Grass-legume hay	Pasture	Winter wheat
		Tons	*Tons*	*Tons*	*AUM*	*Bu*
246:						
Voight	4e	---	---	---	---	---
247:						
Winston	2e	---	---	3.00	7.00	75.00
248:						
Wyant	4e	---	---	---	---	---
249:						
Wyant	7e	---	---	---	---	---
250:						
Xana	6e	---	---	---	---	---
251:						
Xana	7e	---	---	---	---	---
252:						
Xeno	4e	---	---	---	---	---
253:						
Xeno	7e	---	---	---	---	---
254:						
Xerorthents	7e	---	---	---	---	---
255:						
Yalelake	4e	---	---	---	---	---
256:						
Yalelake	7e	---	---	---	---	---
257:						
Yalelake	7e	---	---	---	---	---
258:						
Zenker	7e	---	---	---	---	---
259:						
Zenker	7e	---	---	---	---	---
260:						
Zymer	7e	---	---	---	---	---
261:						
Zymer	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
262:						
Zynbar	4e	---	---	---	---	---
263:						
Water	---	---	---	---	---	---

Table 6.--Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that data were not available.)

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Suggested trees to plant
									m^3/ha	
3:										
Andic Cryumbrepts	11R	Severe	Severe	Slight	Slight	Moderate	Alaska cedar	---	---	Douglas fir, Pacific silver fir, noble fir, western hemlock.
							Douglas fir	---	---	
							Pacific silver fir	---	---	
							Noble fir	---	---	
							Western hemlock	75	11	
Rock outcrop.										
4:										
Andic Cryumbrepts	---	Severe	Severe	Slight	Slight	Slight	Noble fir	---	---	Noble fir.
Rock outcrop.										
6:										
Astoria	20A	Slight	Slight	Slight	Slight	Severe	Douglas fir	137	13	Douglas fir, red alder, western hemlock.
							Sitka spruce	---	---	
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	122	20	
							Western redcedar	---	---	
7:										
Baumgard	12A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	122	12	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
							Western redcedar	---	---	
8:										
Baumgard	12R	Moderate	Severe	Slight	Slight	Severe	Douglas fir	122	12	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
							Western redcedar	---	---	
9:										
Beigle	16A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	119	12	Douglas fir, red alder, western hemlock.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	105	16	
							Western redcedar	---	---	
10:										
Beigle	16R	Moderate	Severe	Slight	Slight	Severe	Douglas fir	119	12	Douglas fir, red alder, western hemlock.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	105	16	
							Western redcedar	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3/ha	
11:										
Boistfort-------	18A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	129	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	114	18	
							Western redcedar----	---	---	
12:										
Buckpeak--------	13R	Moderate	Severe	Slight	Slight	Severe	Douglas fir---------	133	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
13:										
Buckpeak--------	13R	Severe	Severe	Slight	Slight	Severe	Douglas fir---------	133	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
14:										
Bunker----------	17A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	124	12	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	110	17	
							Western redcedar----	---	---	
15:										
Bunker----------	17R	Moderate	Severe	Slight	Slight	Severe	Douglas fir---------	124	12	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	110	17	
							Western redcedar----	---	---	
16:										
Camas-----------	10F	Slight	Slight	Severe	Slight	Moderate	Douglas fir---------	110	10	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western redcedar----	---	---	
17:										
Caples----------	6W	Slight	Severe	Severe	Severe	Severe	Bigleaf maple-------	---	---	Western
							Black cottonwood----	---	---	redcedar.
							Red alder-----------	85	6	
21:										
Centralia-------	14A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	140	14	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
22:										
Centralia-------	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	135	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3/ha	
23:										
Centralia-------	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	135	13	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
24:										
Cinebar---------	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	132	13	Douglas fir.
							Bigleaf maple-------	---	---	
25:										
Cinebar---------	17A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	132	13	Douglas fir.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	110	17	
							Western redcedar----	---	---	
26:										
Cinebar---------	17A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	132	13	Douglas fir.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	110	17	
							Western redcedar----	---	---	
27:										
Cinebar---------	17A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	132	13	Douglas fir.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	110	17	
							Western redcedar----	---	---	
28:										
Cinebar---------	17R	Moderate	Severe	Slight	Slight	Severe	Douglas fir---------	132	13	Douglas fir.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	110	17	
							Western redcedar----	---	---	
29:										
Cinnamon--------	14A	Slight	Moderate	Slight	Slight	Slight	Douglas fir---------	106	11	Douglas fir, western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	96	14	
							Western redcedar----	---	---	
30:										
Cinnamon--------	14R	Moderate	Severe	Slight	Slight	Slight	Douglas fir---------	106	11	Douglas fir, western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	96	14	
							Western redcedar----	---	---	
31:										
Cinnamon--------	14R	Severe	Severe	Slight	Slight	Slight	Douglas fir---------	106	11	Douglas fir, western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	96	14	
							Western redcedar----	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3/ha	
32:										
Clato----------	12W	Slight	Moderate	Moderate	Slight	Severe	Douglas fir---------	125	12	Douglas fir.
							Bigleaf maple-------	---	---	
							Black cottonwood----	---	---	
							Red alder-----------	---	---	
33:										
Coweeman--------	11W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	115	11	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western redcedar----	---	---	
34:										
Coweeman--------	11W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	115	11	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western redcedar----	---	---	
40:										
Dobbs-----------	15D	Slight	Moderate	Slight	Moderate	Moderate	Douglas fir---------	110	10	Douglas fir, Pacific silver fir, western hemlock.
							Pacific silver fir--	---	---	
							Noble fir-----------	---	---	
							Western hemlock-----	100	15	
41:										
Dobbs-----------	15R	Moderate	Severe	Slight	Moderate	Moderate	Douglas fir---------	110	10	Douglas fir, Pacific silver fir, western hemlock.
							Pacific silver fir--	---	---	
							Noble fir-----------	---	---	
							Western hemlock-----	100	15	
42:										
Domell----------	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	126	13	Douglas fir.
							Bigleaf maple-------	---	---	
43:										
Domell----------	16A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	126	13	Douglas fir, red alder, western hemlock.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	105	16	
44:										
Domell----------	16R	Moderate	Severe	Slight	Slight	Severe	Douglas fir---------	126	13	Douglas fir, red alder, western hemlock.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	105	16	
45:										
Domell----------	16X	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	126	13	Douglas fir, red alder, western hemlock.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	105	16	
							Western redcedar----	---	---	
46:										
Domell----------	16R	Moderate	Severe	Slight	Slight	Severe	Douglas fir---------	126	13	Douglas fir, red alder, western hemlock.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	105	16	
							Western redcedar----	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordi- nation symbol	Management concerns: Erosion hazard	Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Plant competi- tion	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3/ha	
47:										
Edgewick	12W	Slight	Moderate	Moderate	Slight	Severe	Douglas fir	125	12	Douglas fir, red alder, western redcedar.
							Red alder	---	---	
							Western redcedar	---	---	
48:										
Elkprairie	---	Moderate	Moderate	Severe	Moderate	Slight	Lodgepole pine	---	---	Lodgepole pine.
49:										
Elochoman	20A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	136	13	Douglas fir, western hemlock.
							Sitka spruce	---	---	
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western redcedar	124	19	
50:										
Ferteg	13W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir	130	13	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
							Western redcedar	---	---	
51:										
Ferteg	13W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir	130	13	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
							Western redcedar	---	---	
52:										
Forsyth	7F	Slight	Moderate	Moderate	Moderate	Moderate	Douglas fir	85	7	Douglas fir, Pacific silver fir, lodgepole pine, western hemlock, western white pine.
							Pacific silver fir	---	---	
							Lodgepole pine	---	---	
							Western hemlock	---	---	
							Western white pine	---	---	
53:										
Forsyth	7R	Severe	Severe	Moderate	Moderate	Moderate	Douglas fir	85	7	Douglas fir, Pacific silver fir, lodgepole pine, western hemlock, western white pine.
							Pacific silver fir	---	---	
							Lodgepole pine	---	---	
							Western hemlock	---	---	
							Western white pine	---	---	
54:										
Germany	18A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	125	12	Douglas fir, western hemlock.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	116	18	
							Western redcedar	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m³/ha	
55:										
Germany	18A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	125	12	Douglas fir, western hemlock.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	116	18	
							Western redcedar	---	---	
56:										
Germany	18A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	125	12	Douglas fir, western hemlock.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	116	18	
							Western redcedar	---	---	
57:										
Germany	18R	Moderate	Severe	Slight	Slight	Severe	Douglas fir	125	12	Douglas fir, western hemlock.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	116	18	
							Western redcedar	---	---	
58:										
Germany	18A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	125	12	Douglas fir, western hemlock.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	116	18	
							Western redcedar	---	---	
59:										
Germany	18A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	125	12	Douglas fir, western hemlock.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	116	18	
							Western redcedar	---	---	
60:										
Germany	18R	Moderate	Severe	Slight	Slight	Severe	Douglas fir	125	12	Douglas fir, western hemlock.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	116	18	
							Western redcedar	---	---	
61:										
Gobar	17A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	124	13	Douglas fir, red alder, western hemlock.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	110	17	
							Western redcedar	---	---	
62:										
Gobar	17R	Moderate	Severe	Slight	Slight	Severe	Douglas fir	124	13	Douglas fir, red alder, western hemlock.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	110	17	
							Western redcedar	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m3/ha	
63:										
Gobar-----------	17R	Severe	Severe	Slight	Slight	Severe	Douglas fir---------	124	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	110	17	
							Western redcedar----	---	---	
64:										
Gobar-----------	17A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	124	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	110	17	
							Western redcedar----	---	---	
65:										
Godfrey---------	7W	Slight	Severe	Severe	Severe	Severe	Bigleaf maple-------	---	---	Red alder,
							Black cottonwood----	---	---	western
							Red alder-----------	90	7	redcedar.
							Western redcedar----	---	---	
66:										
Greenwater------	18S	Slight	Slight	Severe	Slight	Moderate	Douglas fir---------	117	11	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	114	18	
							Western redcedar----	---	---	
67:										
Greenwater------	11S	Slight	Slight	Severe	Slight	Moderate	Douglas fir---------	117	11	Douglas fir.
							Bigleaf maple-------	---	---	
68:										
Greenwater------	18S	Slight	Slight	Severe	Slight	Moderate	Douglas fir---------	117	11	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	114	18	
							Western redcedar----	---	---	
69:										
Greenwater------	18S	Slight	Slight	Severe	Slight	Moderate	Douglas fir---------	117	11	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	114	18	
							Western redcedar----	---	---	
70:										
Hatchet---------	---	Severe	Severe	Severe	Moderate	Slight	Noble fir-----------	---	---	Noble fir.
71:										
Hatchet---------	---	Severe	Severe	Severe	Moderate	Slight	Noble fir-----------	---	---	Noble fir.
72:										
Hatchet---------	12R	Moderate	Severe	Moderate	Moderate	Slight	Douglas fir---------	94	9	Douglas fir,
							Pacific silver fir--	---	---	Pacific silver
							Noble fir-----------	---	---	fir, noble fir,
							Western hemlock-----	81	12	western hemlock.
							Western white pine--	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m³/ha	
73:										
Hatchet---------	12R	Moderate	Severe	Moderate	Moderate	Slight	Douglas fir---------	94	9	Douglas fir,
							Pacific silver fir--	---	---	Pacific silver
							Noble fir-----------	---	---	fir, noble fir,
							Western hemlock-----	81	12	western hemlock.
							Western white pine--	---	---	
Rock outcrop.										
74:										
Hatchet---------	12R	Moderate	Severe	Moderate	Moderate	Slight	Douglas fir---------	94	9	Douglas fir,
							Pacific silver fir--	---	---	Pacific silver
							Noble fir-----------	---	---	fir, noble fir,
							Western hemlock-----	81	12	western hemlock.
							Western white pine--	---	---	
Rock outcrop.										
75:										
Hatchet---------	---	Severe	Severe	Severe	Moderate	Slight	Noble fir-----------	---	---	Noble fir.
Rock outcrop.										
76:										
Hazeldell-------	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	130	13	Douglas fir.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
77:										
Hazeldell-------	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	130	13	Douglas fir.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
78:										
Hazeldell-------	13R	Moderate	Severe	Slight	Slight	Severe	Douglas fir---------	130	13	Douglas fir.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
79:										
Hazeldell-------	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	130	13	Douglas fir.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
80:										
Hazeldell-------	13R	Moderate	Severe	Slight	Slight	Severe	Douglas fir---------	130	13	Douglas fir.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3/ha	
83:										
Hoffstadt-------	11F	Slight	Moderate	Moderate	Slight	Slight	Douglas fir---------	116	11	Douglas fir.
							Bigleaf maple-------	---	---	
84:										
Hoffstadt-------	11R	Moderate	Severe	Moderate	Slight	Slight	Douglas fir---------	116	11	Douglas fir.
							Bigleaf maple-------	---	---	
85:										
Hoffstadt-------	17F	Slight	Moderate	Moderate	Slight	Slight	Douglas fir---------	116	11	Douglas fir,
							Bigleaf maple-------	---	---	western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	108	17	
							Western redcedar----	---	---	
86:										
Hoffstadt-------	17R	Moderate	Severe	Moderate	Slight	Slight	Douglas fir---------	116	11	Douglas fir,
							Bigleaf maple-------	---	---	western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	108	17	
							Western redcedar----	---	---	
87:										
Hoffstadt-------	17R	Moderate	Severe	Moderate	Slight	Slight	Douglas fir---------	116	11	Douglas fir,
							Bigleaf maple-------	---	---	western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	108	17	
							Western redcedar----	---	---	
Rock outcrop.										
88:										
Hoffstadt-------	17R	Severe	Severe	Moderate	Slight	Slight	Douglas fir---------	116	11	Douglas fir,
							Bigleaf maple-------	---	---	western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	108	17	
							Western redcedar----	---	---	
Rock outcrop.										
89:										
Hoffstadt-------	11R	Moderate	Severe	Moderate	Slight	Slight	Douglas fir---------	116	11	Douglas fir.
							Bigleaf maple-------	---	---	
Rock outcrop.										
90:										
Hoffstadt-------	11R	Severe	Severe	Moderate	Slight	Slight	Douglas fir---------	116	11	Douglas fir.
							Bigleaf maple-------	---	---	
Rock outcrop.										
91:										
Jonas-----------	18A	Slight	Moderate	Slight	Slight	Moderate	Douglas fir---------	121	12	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	110	18	
							Western redcedar----	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m³/ha	
92:										
Jonas-----------	18R	Moderate	Severe	Slight	Slight	Severe	Douglas fir---------	121	12	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	110	18	
							Western redcedar----	---	---	
93:										
Kalama----------	13A	Slight	Moderate	Moderate	Moderate	Severe	Douglas fir---------	130	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
94:										
Kalama----------	13A	Slight	Moderate	Moderate	Moderate	Severe	Douglas fir---------	130	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
95:										
Kalama----------	13R	Moderate	Severe	Moderate	Moderate	Severe	Douglas fir---------	130	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
96:										
Katula----------	16R	Moderate	Severe	Moderate	Moderate	Severe	Douglas fir---------	108	10	Douglas fir,
							Pacific silver fir--	---	---	red alder,
							Bigleaf maple-------	---	---	western hemlock.
							Noble fir-----------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	104	16	
97:										
Katula----------	16R	Severe	Severe	Moderate	Moderate	Severe	Douglas fir---------	108	10	Douglas fir,
							Pacific silver fir--	---	---	red alder,
							Bigleaf maple-------	---	---	western hemlock.
							Noble fir-----------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	104	16	
98:										
Katula----------	16R	Moderate	Severe	Moderate	Moderate	Severe	Douglas fir---------	108	10	Douglas fir,
							Pacific silver fir--	---	---	red alder,
							Bigleaf maple-------	---	---	western hemlock.
							Noble fir-----------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	104	16	
Bunker----------	17R	Moderate	Severe	Slight	Slight	Severe	Douglas fir---------	124	12	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	110	17	
							Western redcedar----	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3/ha	
99:										
Katula----------	16R	Severe	Severe	Moderate	Moderate	Severe	Douglas fir---------	108	10	Douglas fir,
							Pacific silver fir--	---	---	red alder,
							Bigleaf maple-------	---	---	western hemlock.
							Noble fir-----------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	104	16	
Bunker----------	17R	Severe	Severe	Slight	Slight	Severe	Douglas fir---------	124	12	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	110	17	
							Western redcedar----	---	---	
100:										
Kelso-----------	13W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	130	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western redcedar----	---	---	
101:										
Kelso-----------	13W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	130	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western redcedar----	---	---	
102:										
Kelso-----------	13W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	130	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western redcedar----	---	---	
103:										
Kelso-----------	13R	Moderate	Severe	Slight	Moderate	Severe	Douglas fir---------	130	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western redcedar----	---	---	
104:										
Kosmos----------	12W	Slight	Severe	Moderate	Severe	Severe	Douglas fir---------	120	12	Douglas fir,
							Oregon ash----------	---	---	red alder,
							Bigleaf maple-------	---	---	western
							Black cottonwood----	---	---	redcedar.
							Red alder-----------	---	---	
							Western redcedar----	---	---	
105:										
Lacamas---------	10W	Slight	Severe	Severe	Severe	Severe	Douglas fir---------	108	10	Douglas fir,
							Oregon ash----------	---	---	western
							Bigleaf maple-------	---	---	redcedar.
							Red alder-----------	90	7	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3/ha	
106:										
Lates-----------	15D	Slight	Moderate	Slight	Moderate	Moderate	Douglas fir---------	110	10	Douglas fir,
							Pacific silver fir--	---	---	Pacific silver
							Sitka spruce--------	---	---	fir, noble fir,
							Bigleaf maple-------	---	---	western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	95	15	
							Western redcedar----	---	---	
107:										
Lates-----------	15R	Moderate	Severe	Slight	Moderate	Moderate	Douglas fir---------	110	10	Douglas fir,
							Pacific silver fir--	---	---	Pacific silver
							Sitka spruce--------	---	---	fir, noble fir,
							Bigleaf maple-------	---	---	western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	95	15	
							Western redcedar----	---	---	
108:										
Lates-----------	15R	Severe	Severe	Slight	Moderate	Moderate	Douglas fir---------	110	10	Douglas fir,
							Pacific silver fir--	---	---	Pacific silver
							Sitka spruce--------	---	---	fir, noble fir,
							Bigleaf maple-------	---	---	western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	95	15	
							Western redcedar----	---	---	
Rock outcrop.										
109:										
Lithic Haplumbrepts---	10R	Severe	Severe	Moderate	Moderate	Severe	Douglas fir---------	110	10	Douglas fir,
							Pacific madrone-----	---	---	red alder,
							Bigleaf maple-------	---	---	western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
111:										
Lonestar--------	11R	Moderate	Severe	Slight	Slight	Moderate	Douglas fir---------	84	7	Douglas fir,
							Pacific silver fir--	---	---	Pacific silver
							Noble fir-----------	---	---	fir, noble fir,
							Western hemlock-----	79	11	western hemlock.
							Western redcedar----	---	---	
							Western white pine--	---	---	
112:										
Lonestar--------	---	Moderate	Moderate	Severe	Slight	Slight	Noble fir-----------	---	---	Noble fir.
113:										
Lonestar--------	---	Severe	Severe	Severe	Slight	Slight	Noble fir-----------	---	---	Noble fir.
114:										
Lonestar--------	---	Severe	Severe	Severe	Slight	Slight	Noble fir-----------	---	---	Noble fir.
115:										
Lonestar--------	11A	Slight	Moderate	Slight	Slight	Moderate	Douglas fir---------	84	7	Douglas fir,
							Pacific silver fir--	---	---	Pacific silver
							Noble fir-----------	---	---	fir, noble fir,
							Western hemlock-----	79	11	western hemlock.
							Western redcedar----	---	---	
							Western white pine--	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3/ha	
116:										
Lonestar	11R	Moderate	Severe	Slight	Slight	Moderate	Douglas fir	84	7	Douglas fir,
							Pacific silver fir	---	---	Pacific silver
							Noble fir	---	---	fir, noble fir,
							Western hemlock	79	11	western hemlock.
							Western redcedar	---	---	
							Western white pine	---	---	
117:										
Lonestar	11R	Severe	Severe	Slight	Slight	Moderate	Douglas fir	84	7	Douglas fir,
							Pacific silver fir	---	---	Pacific silver
							Noble fir	---	---	fir, noble fir,
							Western hemlock	79	11	western hemlock.
							Western redcedar	---	---	
							Western white pine	---	---	
118:										
Lonestar	11A	Slight	Moderate	Slight	Slight	Moderate	Douglas fir	84	7	Douglas fir,
							Pacific silver fir	---	---	Pacific silver
							Noble fir	---	---	fir, noble fir,
							Western hemlock	79	11	western hemlock.
							Western redcedar	---	---	
							Western white pine	---	---	
119:										
Loper	18A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	131	13	Douglas fir,
							Bigleaf maple	---	---	red alder,
							Red alder	---	---	western hemlock.
							Western hemlock	115	18	
							Western redcedar	---	---	
120:										
Loper	18R	Moderate	Severe	Slight	Slight	Severe	Douglas fir	131	13	Douglas fir,
							Bigleaf maple	---	---	red alder,
							Red alder	---	---	western hemlock.
							Western hemlock	115	18	
							Western redcedar	---	---	
121:										
Lytell	20A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	136	13	Douglas fir,
							Sitka spruce	---	---	red alder,
							Red alder	---	---	western hemlock.
							Western hemlock	123	20	
							Western redcedar	---	---	
122:										
Lytell	20R	Moderate	Severe	Slight	Slight	Severe	Douglas fir	132	13	Douglas fir,
							Sitka spruce	---	---	red alder,
							Red alder	---	---	western hemlock.
							Western hemlock	123	20	
							Western redcedar	---	---	
123:										
Mart	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	130	13	Douglas fir,
							Bigleaf maple	---	---	red alder.
							Grand fir	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
							Western redcedar	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m3/ha	
124:										
Mart------------	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	130	13	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Grand fir-----------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
125:										
Mart------------	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	130	13	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Grand fir-----------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
126:										
Mart------------	13R	Moderate	Severe	Slight	Slight	Severe	Douglas fir---------	130	13	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Grand fir-----------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
127:										
Maytown---------	12W	Slight	Moderate	Moderate	Moderate	Severe	Douglas fir---------	120	12	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
128:										
Melbourne-------	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	132	13	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	98	8	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
129:										
Melbourne-------	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	132	13	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	98	8	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
130:										
Minniece--------	10W	Slight	Severe	Severe	Severe	Severe	Douglas fir---------	110	10	Douglas fir, western hemlock, western redcedar.
							Oregon ash----------	---	---	
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
132:										
Mulholland------	17A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	131	13	Douglas fir, red alder, western hemlock.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	110	17	
							Western redcedar----	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3/ha	
133:										
Murnen----------	14A	Slight	Moderate	Slight	Slight	Moderate	Douglas fir---------	109	10	Douglas fir, Pacific silver fir, noble fir, western hemlock.
							Pacific silver fir--	---	---	
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	93	14	
134:										
Natal-----------	6W	Slight	Severe	Severe	Severe	Severe	Oregon ash----------	---	---	Red alder, western redcedar.
							Bigleaf maple-------	---	---	
							Black cottonwood----	---	---	
							Red alder-----------	85	6	
							Western redcedar----	---	---	
135:										
Newaukum--------	12A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	127	12	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
136:										
Newaukum--------	12R	Moderate	Severe	Slight	Slight	Severe	Douglas fir---------	127	12	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
137:										
Newaukum--------	12A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	127	12	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
138:										
Newaukum--------	12R	Moderate	Severe	Slight	Slight	Severe	Douglas fir---------	127	12	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
139:										
Newaukum--------	12R	Severe	Severe	Slight	Slight	Severe	Douglas fir---------	127	12	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
140:										
Newaukum--------	12R	Moderate	Severe	Slight	Slight	Severe	Douglas fir---------	127	12	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
Rock outcrop.										

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3/ha	
141:										
Newberg	12W	Slight	Moderate	Moderate	Slight	Severe	Douglas fir	120	12	Douglas fir, red alder.
							Oregon ash	---	---	
							Bigleaf maple	---	---	
							Black cottonwood	---	---	
							Red alder	---	---	
							Western redcedar	---	---	
142:										
Olequa	12A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	124	12	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
143:										
Olequa	12A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	124	12	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
144:										
Olequa	12A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	124	12	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
145:										
Olequa	12R	Moderate	Severe	Slight	Slight	Severe	Douglas fir	124	12	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
146:										
Olympic	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	133	13	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
							Western redcedar	---	---	
147:										
Olympic	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	133	13	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
							Western redcedar	---	---	
148:										
Olympic	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir	133	13	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
							Western redcedar	---	---	
149:										
Olympic	13R	Moderate	Severe	Slight	Slight	Severe	Douglas fir	133	13	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
							Western redcedar	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3*/ha*	
150:										
Olympic---------	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	133	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
153:										
Pheeney---------	13F	Slight	Moderate	Moderate	Moderate	Moderate	Douglas fir---------	101	10	Douglas fir,
							Bigleaf maple-------	---	---	western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	85	13	
							Western redcedar----	---	---	
154:										
Pheeney---------	13R	Moderate	Severe	Moderate	Moderate	Moderate	Douglas fir---------	101	10	Douglas fir,
							Bigleaf maple-------	---	---	western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	85	13	
							Western redcedar----	---	---	
155:										
Pheeney---------	13R	Severe	Severe	Moderate	Moderate	Moderate	Douglas fir---------	101	10	Douglas fir,
							Bigleaf maple-------	---	---	western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	85	13	
							Western redcedar----	---	---	
156:										
Pheeney---------	13F	Slight	Moderate	Moderate	Moderate	Moderate	Douglas fir---------	101	10	Douglas fir,
							Bigleaf maple-------	---	---	western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	85	13	
							Western redcedar----	---	---	
Beigle----------	16A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	119	12	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	105	16	
							Western redcedar----	---	---	
157:										
Pheeney---------	13R	Moderate	Severe	Moderate	Moderate	Moderate	Douglas fir---------	101	10	Douglas fir,
							Bigleaf maple-------	---	---	western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	85	13	
							Western redcedar----	---	---	
Beigle----------	16R	Moderate	Severe	Slight	Slight	Severe	Douglas fir---------	119	12	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	105	16	
							Western redcedar----	---	---	
158:										
Pheeney---------	13R	Moderate	Severe	Moderate	Moderate	Moderate	Douglas fir---------	101	10	Douglas fir,
							Bigleaf maple-------	---	---	western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	85	13	
							Western redcedar----	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Erosion hazard (Management concerns)	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees (Potential productivity)	Site index	Volume of wood fiber	Suggested trees to plant
									m³/ha	
158:										
Rock outcrop.										
159:										
Pheeney	13R	Severe	Severe	Moderate	Moderate	Moderate	Douglas fir	101	10	Douglas fir, western hemlock.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	85	13	
							Western redcedar	---	---	
Rock outcrop.										
160:										
Pilchuck	11S	Slight	Slight	Severe	Slight	Severe	Douglas fir	114	11	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Black cottonwood	---	---	
							Red alder	---	---	
							Western redcedar	---	---	
162:										
Polepatch	---	Moderate	Severe	Severe	Severe	Slight	Noble fir	---	---	Noble fir.
163:										
Polepatch	7F	Slight	Severe	Severe	Severe	Slight	Douglas fir	---	---	Douglas fir, noble fir, western hemlock.
							Pacific silver fir	---	---	
							Lodgepole pine	---	---	
							Noble fir	---	---	
							Western hemlock	60	7	
							Western white pine	---	---	
164:										
Polepatch	7R	Severe	Severe	Severe	Severe	Slight	Douglas fir	---	---	Douglas fir, noble fir, western hemlock.
							Pacific silver fir	---	---	
							Lodgepole pine	---	---	
							Noble fir	---	---	
							Western hemlock	60	7	
							Western white pine	---	---	
165:										
Polepatch	7X	Slight	Severe	Severe	Severe	Slight	Douglas fir	---	---	Douglas fir, noble fir, western hemlock.
							Pacific silver fir	---	---	
							Lodgepole pine	---	---	
							Noble fir	---	---	
							Western hemlock	60	7	
							Western white pine	---	---	
166:										
Prather	12W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir	120	12	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
							Western redcedar	---	---	
167:										
Prather	12W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir	120	12	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
							Western redcedar	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordi-nation symbol	Management concerns: Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Plant competi-tion	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3/ha	
168:										
Raught----------	18A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	131	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	115	18	
							Western redcedar----	---	---	
169:										
Raught----------	18R	Moderate	Severe	Slight	Slight	Severe	Douglas fir---------	131	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	115	18	
							Western redcedar----	---	---	
170:										
Raught----------	18R	Severe	Severe	Slight	Slight	Severe	Douglas fir---------	131	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder,
							Red alder-----------	---	---	western hemlock.
							Western hemlock-----	115	18	
							Western redcedar----	---	---	
171:										
Reichel---------	15A	Slight	Moderate	Slight	Slight	Moderate	Alaska cedar--------	---	---	Pacific silver
							Douglas fir---------	100	9	fir, noble fir,
							Pacific silver fir--	---	---	western hemlock.
							Noble fir-----------	---	---	
							Western hemlock-----	98	15	
							Western redcedar----	---	---	
174:										
Rose Valley-----	12W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	120	12	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
175:										
Rose Valley-----	12W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	120	12	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
176:										
Salkum----------	12A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	126	12	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Bitter cherry-------	---	---	
							Grand fir-----------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
177:										
Salkum----------	12A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	126	12	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Bitter cherry-------	---	---	
							Grand fir-----------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Suggested trees to plant
									m^3/ha	
178:										
Salkum----------	12A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	126	12	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Bitter cherry-------	---	---	
							Grand fir-----------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
179:										
Sara------------	11W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	116	11	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western redcedar----	---	---	
180:										
Sara------------	11W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	116	11	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western redcedar----	---	---	
181:										
Sara------------	11W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	116	11	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western redcedar----	---	---	
182:										
Sara------------	11W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	116	11	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western redcedar----	---	---	
183:										
Sarazan---------	15A	Slight	Moderate	Slight	Slight	Moderate	Douglas fir---------	115	11	Douglas fir, western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	100	15	
							Western redcedar----	---	---	
184:										
Sarazan---------	15R	Moderate	Severe	Slight	Slight	Moderate	Douglas fir---------	115	11	Douglas fir, western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	100	15	
							Western redcedar----	---	---	
185:										
Sauvola---------	12W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	116	12	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Grand fir-----------	---	---	
							Red alder-----------	---	---	
							Western redcedar----	---	---	
186:										
Sauvola---------	11W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	108	11	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Grand fir-----------	---	---	
							Red alder-----------	---	---	
							Western redcedar----	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3/ha	
187:										
Sauvola---------	11W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	108	11	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Grand fir-----------	---	---	
							Red alder-----------	---	---	
							Western redcedar----	---	---	
188:										
Schneider-------	11F	Slight	Moderate	Moderate	Slight	Severe	Douglas fir---------	113	11	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
189:										
Schneider-------	11R	Moderate	Severe	Moderate	Slight	Severe	Douglas fir---------	113	11	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
190:										
Schneider-------	11R	Moderate	Severe	Moderate	Slight	Severe	Douglas fir---------	113	11	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
Rock outcrop.										
191:										
Schneider-------	11R	Severe	Severe	Moderate	Slight	Severe	Douglas fir---------	113	11	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
Rock outcrop.										
192:										
Seaquest--------	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	130	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western redcedar----	---	---	
193:										
Seaquest--------	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	130	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western redcedar----	---	---	
194:										
Seaquest--------	13A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	130	13	Douglas fir,
							Bigleaf maple-------	---	---	red alder.
							Red alder-----------	---	---	
							Western redcedar----	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3/ha	
196:										
Siouxon	11F	Slight	Slight	Moderate	Slight	Severe	Douglas fir	115	11	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
							Western redcedar	---	---	
197:										
Siouxon	11R	Moderate	Severe	Moderate	Slight	Severe	Douglas fir	115	11	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
							Western redcedar	---	---	
198:										
Siouxon	11R	Severe	Severe	Moderate	Slight	Severe	Douglas fir	115	11	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
							Western redcedar	---	---	
Rock outcrop.										
199:										
Snohomish	6W	Slight	Severe	Severe	Moderate	Severe	Sitka spruce	---	---	Red alder, western redcedar.
							Red alder	80	6	
							Western hemlock	---	---	
							Western redcedar	---	---	
200:										
Solo	14S	Slight	Slight	Severe	Moderate	Severe	Douglas fir	105	10	Douglas fir, red alder.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	95	14	
201:										
Speelyai	8S	Slight	Slight	Severe	Severe	Severe	Douglas fir	88	8	Douglas fir.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
202:										
Speelyai	8R	Moderate	Severe	Severe	Severe	Severe	Douglas fir	88	8	Douglas fir.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	---	---	
203:										
Spodic Cryopsamments	12S	Slight	Moderate	Moderate	Moderate	Slight	Douglas fir	85	7	Douglas fir, Pacific silver fir, noble fir, western hemlock.
							Pacific silver fir	---	---	
							Western hemlock	80	12	
							Western white pine	---	---	
204:										
Stahl	14R	Moderate	Severe	Moderate	Moderate	Moderate	Douglas fir	95	8	Douglas fir, Pacific silver fir, noble fir, western hemlock.
							Pacific silver fir	---	---	
							Noble fir	---	---	
							Western hemlock	91	14	
							Western redcedar	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3/ha	
205:										
Stahl-----------	14D	Slight	Moderate	Moderate	Moderate	Moderate	Douglas fir---------	95	8	Douglas fir, Pacific silver fir, noble fir, western hemlock.
							Pacific silver fir--	---	---	
							Noble fir-----------	---	---	
							Western hemlock-----	91	14	
							Western redcedar----	---	---	
Reichel---------	15A	Slight	Moderate	Slight	Slight	Moderate	Alaska cedar--------	---	---	Pacific silver fir, noble fir, western hemlock.
							Douglas fir---------	100	9	
							Pacific silver fir--	---	---	
							Noble fir-----------	---	---	
							Western hemlock-----	98	15	
							Western redcedar----	---	---	
206:										
Stahl-----------	14R	Moderate	Severe	Moderate	Moderate	Moderate	Douglas fir---------	95	8	Douglas fir, Pacific silver fir, noble fir, western hemlock.
							Pacific silver fir--	---	---	
							Noble fir-----------	---	---	
							Western hemlock-----	91	14	
							Western redcedar----	---	---	
Reichel---------	15R	Moderate	Severe	Slight	Slight	Moderate	Alaska cedar--------	---	---	Pacific silver fir, noble fir, western hemlock.
							Douglas fir---------	100	9	
							Pacific silver fir--	---	---	
							Noble fir-----------	---	---	
							Western hemlock-----	98	15	
							Western redcedar----	---	---	
207:										
Stahl-----------	14R	Moderate	Severe	Moderate	Moderate	Moderate	Douglas fir---------	95	8	Douglas fir, Pacific silver fir, noble fir, western hemlock.
							Pacific silver fir--	---	---	
							Noble fir-----------	---	---	
							Western hemlock-----	91	14	
							Western redcedar----	---	---	
Rock outcrop.										
208:										
Stella----------	13W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	130	13	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Grand fir-----------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
209:										
Stella----------	13W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	130	13	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Grand fir-----------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
210:										
Stella----------	13W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	130	13	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Grand fir-----------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3/ha	
212:										
Swem	18W	Slight	Moderate	Slight	Moderate	Severe	Douglas fir	125	12	Douglas fir,
							Sitka spruce	---	---	red alder,
							Bigleaf maple	---	---	western hemlock.
							Red alder	---	---	
							Western hemlock	114	18	
							Western redcedar	---	---	
213:										
Swem	18R	Moderate	Severe	Slight	Moderate	Severe	Douglas fir	125	12	Douglas fir,
							Sitka spruce	---	---	red alder,
							Bigleaf maple	---	---	western hemlock.
							Red alder	---	---	
							Western hemlock	114	18	
							Western redcedar	---	---	
214:										
Swift	9R	Severe	Severe	Severe	Slight	Slight	Douglas fir	96	9	Douglas fir.
							Bigleaf maple	---	---	
215:										
Swift	9R	Severe	Severe	Severe	Slight	Slight	Douglas fir	96	9	Douglas fir.
							Bigleaf maple	---	---	
216:										
Swift	12A	Moderate	Moderate	Severe	Slight	Slight	Douglas fir	96	9	Douglas fir,
							Bigleaf maple	---	---	western hemlock.
							Red alder	---	---	
							Western hemlock	83	12	
							Western redcedar	---	---	
217:										
Swift	12R	Severe	Severe	Severe	Slight	Slight	Douglas fir	96	9	Douglas fir,
							Bigleaf maple	---	---	western hemlock.
							Red alder	---	---	
							Western hemlock	83	12	
							Western redcedar	---	---	
218:										
Swift	12R	Severe	Severe	Severe	Slight	Slight	Douglas fir	96	9	Douglas fir,
							Bigleaf maple	---	---	western hemlock.
							Red alder	---	---	
							Western hemlock	83	12	
							Western redcedar	---	---	
219:										
Swift	12R	Severe	Severe	Severe	Slight	Slight	Douglas fir	96	9	Douglas fir,
							Bigleaf maple	---	---	western hemlock.
							Red alder	---	---	
							Western hemlock	83	12	
							Western redcedar	---	---	
Rock outcrop.										
220:										
Swift	12R	Severe	Severe	Severe	Slight	Slight	Douglas fir	96	9	Douglas fir,
							Bigleaf maple	---	---	western hemlock.
							Red alder	---	---	
							Western hemlock	83	12	
							Western redcedar	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m³/ha	
220:										
Rock outcrop.										
221:										
Swift-----------	9R	Severe	Severe	Severe	Slight	Slight	Douglas fir---------	96	9	Douglas fir.
							Bigleaf maple-------	---	---	
Rock outcrop.										
222:										
Vader-----------	12A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	122	12	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Bitter cherry-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
223:										
Vader-----------	12R	Moderate	Severe	Slight	Slight	Severe	Douglas fir---------	122	12	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Bitter cherry-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
224:										
Vanson----------	---	Slight	Moderate	Slight	Slight	Slight	Noble fir-----------	---	---	Noble fir.
225:										
Vanson----------	---	Moderate	Severe	Slight	Slight	Slight	Noble fir-----------	---	---	Noble fir.
226:										
Vanson----------	---	Severe	Severe	Slight	Slight	Slight	Noble fir-----------	---	---	Noble fir.
227:										
Vanson----------	---	Slight	Moderate	Moderate	Slight	Slight	Noble fir-----------	---	---	Noble fir.
228:										
Vanson----------	---	Moderate	Severe	Moderate	Slight	Slight	Noble fir-----------	---	---	Noble fir.
229:										
Vanson----------	12A	Slight	Moderate	Slight	Slight	Slight	Douglas fir---------	77	6	Douglas fir, Pacific silver fir, noble fir, western hemlock.
							Pacific silver fir--	---	---	
							Noble fir-----------	---	---	
							Western hemlock-----	78	12	
							Western white pine--	---	---	
230:										
Vanson----------	12R	Moderate	Severe	Slight	Slight	Slight	Douglas fir---------	77	6	Douglas fir, Pacific silver fir, noble fir, western hemlock.
							Pacific silver fir--	---	---	
							Noble fir-----------	---	---	
							Western hemlock-----	78	12	
							Western white pine--	---	---	
231:										
Vanson----------	12R	Severe	Severe	Slight	Slight	Slight	Douglas fir---------	77	6	Douglas fir, Pacific silver fir, noble fir, western hemlock.
							Pacific silver fir--	---	---	
							Noble fir-----------	---	---	
							Western hemlock-----	78	12	
							Western white pine--	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m³/ha	
232:										
Vanson	12A	Slight	Moderate	Moderate	Slight	Slight	Douglas fir	77	6	Douglas fir,
							Pacific silver fir	---	---	Pacific silver
							Noble fir	---	---	fir, noble fir,
							Western hemlock	78	12	western hemlock.
							Western white pine	---	---	
233:										
Vanson	12R	Moderate	Severe	Moderate	Slight	Slight	Douglas fir	77	6	Douglas fir,
							Pacific silver fir	---	---	Pacific silver
							Noble fir	---	---	fir, noble fir,
							Western hemlock	78	12	western hemlock.
							Western white pine	---	---	
234:										
Vanson	13A	Slight	Moderate	Moderate	Slight	Slight	Douglas fir	96	9	Douglas fir,
							Pacific silver fir	---	---	Pacific silver
							Noble fir	---	---	fir, noble fir,
							Western hemlock	82	13	western hemlock.
235:										
Vanson	13R	Moderate	Severe	Moderate	Slight	Slight	Douglas fir	96	9	Douglas fir,
							Pacific silver fir	---	---	Pacific silver
							Noble fir	---	---	fir, noble fir,
							Western hemlock	82	13	western hemlock.
236:										
Vanson	---	Slight	Moderate	Slight	Slight	Slight	Noble fir	---	---	Noble fir.
Hatchet	12S	Moderate	Moderate	Severe	Moderate	Slight	Noble fir	---	---	Noble fir.
237:										
Vanson	---	Moderate	Severe	Slight	Slight	Slight	Noble fir	---	---	Noble fir.
Hatchet	12R	Severe	Severe	Severe	Moderate	Slight	Noble fir	---	---	Noble fir.
238:										
Vanson	---	Severe	Severe	Slight	Slight	Slight	Noble fir	---	---	Noble fir.
Hatchet	12R	Severe	Severe	Severe	Moderate	Slight	Noble fir	---	---	Noble fir.
239:										
Vanson	12A	Slight	Moderate	Slight	Slight	Slight	Douglas fir	77	6	Douglas fir,
							Pacific silver fir	---	---	Pacific silver
							Noble fir	---	---	fir, noble fir,
							Western hemlock	78	12	western hemlock.
							Western white pine	---	---	
Hatchet	12F	Slight	Moderate	Moderate	Moderate	Slight	Douglas fir	94	9	Douglas fir,
							Pacific silver fir	---	---	Pacific silver
							Noble fir	---	---	fir, noble fir,
							Western hemlock	81	12	western hemlock.
							Western white pine	---	---	
240:										
Vanson	12R	Moderate	Severe	Slight	Slight	Slight	Douglas fir	77	6	Douglas fir,
							Pacific silver fir	---	---	Pacific silver
							Noble fir	---	---	fir, noble fir,
							Western hemlock	78	12	western hemlock.
							Western white pine	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordi- nation symbol	Management concerns: Erosion hazard	Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Plant competi- tion	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m³/ha	
240:										
Hatchet---------	12R	Moderate	Severe	Moderate	Moderate	Slight	Douglas fir---------	94	9	Douglas fir,
							Pacific silver fir--	---	---	Pacific silver
							Noble fir-----------	---	---	fir, noble fir,
							Western hemlock-----	81	12	western hemlock.
							Western white pine--	---	---	
241:										
Vanson----------	12R	Severe	Severe	Slight	Slight	Slight	Douglas fir---------	77	6	Douglas fir,
							Pacific silver fir--	---	---	Pacific silver
							Noble fir-----------	---	---	fir, noble fir,
							Western hemlock-----	78	12	western hemlock.
							Western white pine--	---	---	
Hatchet---------	12R	Moderate	Severe	Moderate	Moderate	Slight	Douglas fir---------	94	9	Douglas fir,
							Pacific silver fir--	---	---	Pacific silver
							Noble fir-----------	---	---	fir, noble fir,
							Western hemlock-----	81	12	western hemlock.
							Western white pine--	---	---	
242:										
Vanson----------	12R	Moderate	Severe	Slight	Slight	Slight	Douglas fir---------	77	6	Douglas fir,
							Pacific silver fir--	---	---	Pacific silver
							Noble fir-----------	---	---	fir, noble fir,
							Western hemlock-----	78	12	western hemlock.
							Western white pine--	---	---	
Rock outcrop.										
243:										
Vanson----------	12R	Severe	Severe	Slight	Slight	Slight	Douglas fir---------	77	6	Douglas fir,
							Pacific silver fir--	---	---	Pacific silver
							Noble fir-----------	---	---	fir, noble fir,
							Western hemlock-----	78	12	western hemlock.
							Western white pine--	---	---	
Rock outcrop.										
244:										
Vanson----------	---	Moderate	Severe	Slight	Slight	Slight	Noble fir-----------	---	---	Noble fir.
Rock outcrop.										
245:										
Vanson----------	---	Severe	Severe	Slight	Slight	Slight	Noble fir-----------	---	---	Noble fir.
Rock outcrop.										
246:										
Voight----------	16A	Slight	Moderate	Slight	Slight	Moderate	Douglas fir---------	114	11	Douglas fir,
							Bigleaf maple-------	---	---	western hemlock.
							Red alder-----------	---	---	
							Western hemlock-----	105	16	
							Western redcedar----	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m^3/ha	
247:										
Winston---------	18A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	125	12	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	114	18	
							Western redcedar----	---	---	
248:										
Wyant-----------	11D	Slight	Moderate	Slight	Moderate	Severe	Douglas fir---------	113	11	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
249:										
Wyant-----------	11R	Moderate	Severe	Slight	Moderate	Severe	Douglas fir---------	113	11	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
							Western redcedar----	---	---	
250:										
Xana------------	12A	Slight	Moderate	Moderate	Moderate	Slight	Douglas fir---------	85	7	Douglas fir, Pacific silver fir, noble fir, western hemlock.
							Pacific silver fir--	---	---	
							Noble fir-----------	---	---	
							Western hemlock-----	80	12	
							Western white pine--	---	---	
251:										
Xana------------	12R	Moderate	Severe	Moderate	Moderate	Slight	Douglas fir---------	85	7	Douglas fir, Pacific silver fir, noble fir, western hemlock.
							Pacific silver fir--	---	---	
							Noble fir-----------	---	---	
							Western hemlock-----	80	12	
							Western white pine--	---	---	
252:										
Xeno------------	15A	Slight	Moderate	Slight	Slight	Moderate	Douglas fir---------	114	11	Douglas fir, western hemlock.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	100	15	
							Western redcedar----	---	---	
253:										
Xeno------------	15R	Moderate	Severe	Slight	Slight	Moderate	Douglas fir---------	114	11	Douglas fir, western hemlock.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	100	15	
							Western redcedar----	---	---	
254:										
Xerorthents-----	8R	Severe	Severe	Severe	Moderate	Severe	Douglas fir---------	90	8	Douglas fir, red alder.
							Bigleaf maple-------	---	---	
							Red alder-----------	---	---	
							Western hemlock-----	---	---	
255:										
Yalelake--------	17A	Slight	Moderate	Slight	Slight	Severe	Douglas fir---------	120	12	Douglas fir, western hemlock.
							Bigleaf maple-------	---	---	
							Western hemlock-----	110	17	
							Western redcedar----	---	---	

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
									m³/ha	
256:										
Yalelake	17R	Moderate	Severe	Slight	Slight	Severe	Douglas fir	120	12	Douglas fir, western hemlock.
							Bigleaf maple	---	---	
							Western hemlock	110	17	
							Western redcedar	---	---	
257:										
Yalelake	17R	Severe	Severe	Slight	Slight	Severe	Douglas fir	120	12	Douglas fir, western hemlock.
							Bigleaf maple	---	---	
							Western hemlock	110	17	
							Western redcedar	---	---	
258:										
Zenker	19R	Moderate	Severe	Slight	Slight	Severe	Douglas fir	133	13	Douglas fir, red alder, western hemlock.
							Sitka spruce	---	---	
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	122	19	
							Western redcedar	---	---	
259:										
Zenker	19R	Severe	Severe	Slight	Slight	Severe	Douglas fir	127	12	Douglas fir, red alder, western hemlock.
							Sitka spruce	---	---	
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	122	19	
							Western redcedar	---	---	
260:										
Zymer	17R	Moderate	Severe	Moderate	Slight	Severe	Douglas fir	125	12	Douglas fir, western hemlock.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	110	17	
							Western redcedar	---	---	
261:										
Zymer	17R	Severe	Severe	Moderate	Slight	Severe	Douglas fir	125	12	Douglas fir, western hemlock.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	110	17	
							Western redcedar	---	---	
Rock outcrop.										
262:										
Zynbar	17A	Slight	Moderate	Slight	Slight	Moderate	Douglas fir	123	12	Douglas fir, western hemlock.
							Bigleaf maple	---	---	
							Red alder	---	---	
							Western hemlock	110	17	
							Western redcedar	---	---	

Table 7.--Woodland Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that data were not available.)

Map symbol and soil name	Mean site index at 50 years		Mean site index at 100 years		Estimated growth of unmanaged stands at culmination		
	Species	Index	Species	Index	Species	Cubic feet per acre	Age
3:							
Andic Cryumbrepts	Western hemlock	75	Western hemlock	105	Western hemlock	151	60
Rock outcrop.							
4:							
Andic Cryumbrepts	Noble fir	---	Noble fir	---	---	---	---
Rock outcrop.							
6	Douglas fir	137	Douglas fir	180	Douglas fir	181	60
Astoria	Western hemlock	122	Western hemlock	173	Western hemlock	279	50
7, 8	Douglas fir	122	Douglas fir	160	Douglas fir	179	60
Baumgard							
9, 10	Western hemlock	105	Western hemlock	148	Western hemlock	234	50
Beigle	Douglas fir	119	Douglas fir	157	Douglas fir	167	60
11	Douglas fir	129	Douglas fir	170	Douglas fir	181	60
Boistfort	Western hemlock	114	Western hemlock	161	Western hemlock	256	50
12, 13	Douglas fir	133	Douglas fir	176	Douglas fir	187	60
Buckpeak							
14, 15	Douglas fir	124	Douglas fir	161	Douglas fir	171	65
Bunker	Western hemlock	110	Western hemlock	156	Western hemlock	248	50
16	Douglas fir	110	Douglas fir	144	Douglas fir	150	60
Camas							
17	Red alder	85	---	---	Red alder	92	40
Caples							
21	Douglas fir	140	Douglas fir	188	Douglas fir	198	60
Centralia							
22, 23	Douglas fir	135	Douglas fir	180	Douglas fir	191	60
Centralia							
24	Douglas fir	132	Douglas fir	174	Douglas fir	185	60
Cinebar							
25, 26, 27, 28	Douglas fir	132	Douglas fir	174	Douglas fir	185	60
Cinebar	Western hemlock	110	Western hemlock	155	Western hemlock	246	50
29, 30, 31	Douglas fir	106	Douglas fir	145	Douglas fir	152	60
Cinnamon	Western hemlock	96	Western hemlock	133	Western hemlock	205	50
32	Douglas fir	125	Douglas fir	167	Douglas fir	178	60
Clato							
33, 34	Douglas fir	115	Douglas fir	150	Douglas fir	158	60
Coweeman							
40, 41	Douglas fir	110	Douglas fir	144	Douglas fir	150	60
Dobbs	Western hemlock	100	Western hemlock	140	Western hemlock	218	60

Table 7.--Woodland Productivity--Continued

Map symbol and soil name	Mean site index at 50 years		Mean site index at 100 years		Estimated growth of unmanaged stands at culmination		
	Species	Index	Species	Index	Species	Cubic feet per acre	Age
42------------------- Domell	Douglas fir-----------	126	Douglas fir-----------	174	Douglas fir-----------	185	60
43, 44, 45, 46------- Domell	Douglas fir----------- Western hemlock-------	126 105	Douglas fir----------- Western hemlock-------	174 148	Douglas fir----------- Western hemlock-------	185 234	60 50
47------------------- Edgewick	Douglas fir-----------	125	Douglas fir-----------	167	Douglas fir-----------	178	60
48------------------- Elkprairie	Lodgepole pine--------	---	Lodgepole pine--------	---	---	---	---
49------------------- Elochoman	Douglas fir----------- Western hemlock-------	136 124	Douglas fir----------- Western hemlock-------	178 178	Douglas fir----------- Western hemlock-------	189 288	60 50
50, 51--------------- Ferteg	Douglas fir-----------	130	Douglas fir-----------	173	Douglas fir-----------	184	60
52, 53--------------- Forsyth	Douglas fir-----------	85	Douglas fir-----------	110	Douglas fir-----------	98	60
54, 55, 56, 57, 58, 59, 60-------------- Germany	Douglas fir----------- Western hemlock-------	125 116	Douglas fir----------- Western hemlock-------	163 165	Douglas fir----------- Western hemlock-------	173 264	65 50
61, 62, 63, 64------- Gobar	Douglas fir----------- Western hemlock-------	124 110	Douglas fir----------- Western hemlock-------	169 154	Douglas fir----------- Western hemlock-------	180 244	60 50
65------------------- Godfrey	Red alder-------------	90	---	---	Red alder-------------	101	40
66------------------- Greenwater	Douglas fir----------- Western hemlock-------	117 114	Douglas fir----------- Western hemlock-------	152 164	Douglas fir----------- Western hemlock-------	161 262	60 50
67------------------- Greenwater	Douglas fir-----------	117	Douglas fir-----------	152	Douglas fir-----------	161	60
68, 69--------------- Greenwater	Douglas fir----------- Western hemlock-------	117 114	Douglas fir----------- Western hemlock-------	152 164	Douglas fir----------- Western hemlock-------	161 262	60 50
70, 71--------------- Hatchet	Noble fir-------------	---	Noble fir-------------	---	---	---	---
72------------------- Hatchet	Western hemlock------- Douglas fir-----------	81 94	Western hemlock------- Douglas fir-----------	118 127	Western hemlock------- Douglas fir-----------	176 125	50 70
73, 74: Hatchet-------------	Western hemlock------- Douglas fir-----------	81 94	Western hemlock------- Douglas fir-----------	118 127	Western hemlock------- Douglas fir-----------	176 125	50 70
Rock outcrop.							
75: Hatchet-------------	Noble fir-------------	---	Noble fir-------------	---	---	---	---
Rock outcrop.							
76, 77, 78, 79, 80--- Hazeldell	Douglas fir-----------	130	Douglas fir-----------	170	Douglas fir-----------	181	60

Table 7.--Woodland Productivity--Continued

Map symbol and soil name	Mean site index at 50 years: Species	Mean site index at 50 years: Index	Mean site index at 100 years: Species	Mean site index at 100 years: Index	Estimated growth of unmanaged stands at culmination: Species	Cubic feet per acre	Age
83, 84--------------- Hoffstadt	Douglas fir-----------	116	Douglas fir-----------	150	Douglas fir-----------	158	60
85, 86--------------- Hoffstadt	Douglas fir-----------	116	Douglas fir-----------	150	Douglas fir-----------	158	60
	Western hemlock-------	108	Western hemlock-------	155	Western hemlock-------	246	50
87, 88:							
Hoffstadt-----------	Douglas fir-----------	116	Douglas fir-----------	150	Douglas fir-----------	158	60
	Western hemlock-------	108	Western hemlock-------	155	Western hemlock-------	246	50
Rock outcrop.							
89, 90:							
Hoffstadt-----------	Douglas fir-----------	116	Douglas fir-----------	150	Douglas fir-----------	158	60
Rock outcrop.							
91, 92--------------- Jonas	Douglas fir-----------	121	Douglas fir-----------	158	Douglas fir-----------	168	65
	Western hemlock-------	110	Western hemlock-------		Western hemlock-------	254	50
93, 94, 95----------- Kalama	Douglas fir-----------	130	Douglas fir-----------	173	Douglas fir-----------	183	60
96, 97--------------- Katula	Douglas fir-----------	108	Douglas fir-----------	143	Douglas fir-----------	149	65
	Western hemlock-------	104	Western hemlock-------	145	Western hemlock-------	228	50
98, 99:							
Katula--------------	Douglas fir-----------	108	Douglas fir-----------	143	Douglas fir-----------	149	65
	Western hemlock-------	104	Western hemlock-------	145	Western hemlock-------	228	50
Bunker--------------	Douglas fir-----------	124	Douglas fir-----------	161	Douglas fir-----------	171	65
	Western hemlock-------	110	Western hemlock-------	156	Western hemlock-------	248	50
100, 101, 102, 103--- Kelso	Douglas fir-----------	130	Douglas fir-----------	173	Douglas fir-----------	183	60
104------------------ Kosmos	Douglas fir-----------	120	Douglas fir-----------	160	Douglas fir-----------	170	65
105------------------ Lacamas	Douglas fir-----------	108	Douglas fir-----------	137	Douglas fir-----------	140	70
	Red alder-------------	90	---	---	Red alder-------------	101	40
106, 107------------- Lates	Douglas fir-----------	110	Douglas fir-----------	138	Douglas fir-----------	142	70
	Western hemlock-------	95	Western hemlock-------	135	Western hemlock-------	209	50
108:							
Lates---------------	Douglas fir-----------	110	Douglas fir-----------	138	Douglas fir-----------	142	70
	Western hemlock-------	95	Western hemlock-------	135	Western hemlock-------	209	50
Rock outcrop.							
109------------------ Lithic Haplumbrepts	Douglas fir-----------	110	Douglas fir-----------	144	Douglas fir-----------	150	60
111------------------ Lonestar	Western hemlock-------	79	Western hemlock-------	112	Western hemlock-------	164	50
	Douglas fir-----------	84	Douglas fir-----------	112	Douglas fir-----------	101	60
112, 113, 114-------- Lonestar	Noble fir-------------	---	Noble fir-------------	---	---	---	---

Table 7.--Woodland Productivity--Continued

Map symbol and soil name	Mean site index at 50 years: Species	Index	Mean site index at 100 years: Species	Index	Estimated growth of unmanaged stands at culmination: Species	Cubic feet per acre	Age
115, 116, 117, 118--- Lonestar	Western hemlock-------	79	Western hemlock-------	112	Western hemlock-------	164	50
	Douglas fir-----------	84	Douglas fir-----------	112	Douglas fir-----------	101	60
119, 120------------- Loper	Douglas fir-----------	131	Douglas fir-----------	176	Douglas fir-----------	187	60
	Western hemlock-------	115	Western hemlock-------	162	Western hemlock-------	258	50
121------------------ Lytell	Douglas fir-----------	136	Douglas fir-----------	181	Douglas fir-----------	192	60
	Western hemlock-------	123	Western hemlock-------	173	Western hemlock-------	279	50
122------------------ Lytell	Douglas fir-----------	132	Douglas fir-----------	174	Douglas fir-----------	185	60
	Western hemlock-------	123	Western hemlock-------	173	Western hemlock-------	279	50
123, 124, 125, 126--- Mart	Douglas fir-----------	130	Douglas fir-----------	173	Douglas fir-----------	183	60
127------------------ Maytown	Douglas fir-----------	120	Douglas fir-----------	160	Douglas fir-----------	170	65
128, 129------------- Melbourne	Douglas fir-----------	132	Douglas fir-----------	175	Douglas fir-----------	186	60
	Red alder-------------	98	---	---	Red alder-------------	115	40
130------------------ Minniece	Douglas fir-----------	110	Douglas fir-----------	144	Douglas fir-----------	150	60
132------------------ Mulholland	Douglas fir-----------	131	Douglas fir-----------	175	Douglas fir-----------	186	60
	Western hemlock-------	110	Western hemlock-------	154	Western hemlock-------	244	50
133------------------ Murnen	Douglas fir-----------	109	Douglas fir-----------	136	Douglas fir-----------	139	70
	Western hemlock-------	93	Western hemlock-------	131	Western hemlock-------	202	50
134------------------ Natal	Red alder-------------	85	---	---	Red alder-------------	92	40
135, 136, 137, 138, 139------------------ Newaukum	Douglas fir-----------	127	Douglas fir-----------	164	Douglas fir-----------	174	60
140:							
Newaukum------------	Douglas fir-----------	127	Douglas fir-----------	164	Douglas fir-----------	174	60
Rock outcrop.							
141------------------ Newberg	Douglas fir-----------	120	Douglas fir-----------	160	Douglas fir-----------	170	65
142, 143, 144, 145--- Olequa	Douglas fir-----------	124	Douglas fir-----------	162	Douglas fir-----------	172	65
146, 147, 148, 149, 150------------------ Olympic	Douglas fir-----------	133	Douglas fir-----------	175	Douglas fir-----------	186	60
153, 154, 155-------- Pheeney	Douglas fir-----------	101	Douglas fir-----------	135	Douglas fir-----------	138	70
	Western hemlock-------	85	Western hemlock-------	121	Western hemlock-------	182	50
156, 157:							
Pheeney-------------	Douglas fir-----------	101	Douglas fir-----------	135	Douglas fir-----------	138	70
	Western hemlock-------	85	Western hemlock-------	121	Western hemlock-------	182	50
Beigle--------------	Douglas fir-----------	119	Douglas fir-----------	157	Douglas fir-----------	167	60
	Western hemlock-------	105	Western hemlock-------	148	Western hemlock-------	234	50

Table 7.--Woodland Productivity--Continued

Map symbol and soil name	Mean site index at 50 years: Species	Index	Mean site index at 100 years: Species	Index	Estimated growth of unmanaged stands at culmination: Species	Cubic feet per acre	Age
158, 159:							
Pheeney	Douglas fir	101	Douglas fir	135	Douglas fir	138	70
	Western hemlock	85	Western hemlock	121	Western hemlock	182	50
Rock outcrop.							
160 Pilchuck	Douglas fir	114	Douglas fir	152	Douglas fir	161	60
162 Polepatch	Noble fir	---	Noble fir	---	---	---	---
163, 164, 165 Polepatch	Western hemlock	60	Western hemlock	84	Western hemlock	95	60
166, 167 Prather	Douglas fir	120	Douglas fir	156	Douglas fir	165	60
168, 169, 170 Raught	Douglas fir	131	Douglas fir	176	Douglas fir	187	60
	Western hemlock	115	Western hemlock	162	Western hemlock	258	50
171 Reichel	Douglas fir	100	Douglas fir	131	Douglas fir	132	70
	Western hemlock	98	Western hemlock	138	Western hemlock	214	50
174, 175 Rose Valley	Douglas fir	120	Douglas fir	160	Douglas fir	170	65
176, 177, 178 Salkum	Douglas fir	126	Douglas fir	164	Douglas fir	174	60
179, 180, 181, 182 Sara	Douglas fir	116	Douglas fir	151	Douglas fir	159	60
183, 184 Sarazan	Douglas fir	115	Douglas fir	150	Douglas fir	158	60
	Western hemlock	100	Western hemlock	140	Western hemlock	218	60
185 Sauvola	Douglas fir	116	Douglas fir	156	Douglas fir	165	60
186, 187 Sauvola	Douglas fir	108	Douglas fir	145	Douglas fir	152	60
188, 189 Schneider	Douglas fir	113	Douglas fir	151	Douglas fir	159	60
190, 191:							
Schneider	Douglas fir	113	Douglas fir	151	Douglas fir	159	60
Rock outcrop.							
192, 193, 194 Seaquest	Douglas fir	130	Douglas fir	170	Douglas fir	181	60
196, 197 Siouxon	Douglas fir	115	Douglas fir	151	Douglas fir	159	60
198:							
Siouxon	Douglas fir	115	Douglas fir	151	Douglas fir	159	60
Rock outcrop.							

Table 7.--Woodland Productivity--Continued

Map symbol and soil name	Mean site index at 50 years: Species	Index	Mean site index at 100 years: Species	Index	Estimated growth of unmanaged stands at culmination: Species	Cubic feet per acre	Age
199------------------ Snohomish	Red alder------------	80	---	---	Red alder------------	84	40
200------------------ Solo	Douglas fir-----------	105	Douglas fir-----------	142	Douglas fir-----------	148	65
	Western hemlock-------	95	Western hemlock-------	133	Western hemlock-------	205	50
201, 202------------- Speelyai	Douglas fir-----------	88	Douglas fir-----------	118	Douglas fir-----------	111	60
203------------------ Spodic Cryopsamments	Douglas fir-----------	85	Douglas fir-----------	110	Douglas fir-----------	98	60
	Western hemlock-------	80	Western hemlock-------	113	Western hemlock-------	166	50
204------------------ Stahl	Western hemlock-------	91	Western hemlock-------	130	Western hemlock-------	200	50
	Douglas fir-----------	95	Douglas fir-----------	124	Douglas fir-----------	121	70
205, 206:							
Stahl---------------	Douglas fir-----------	95	Douglas fir-----------	124	Douglas fir-----------	121	70
	Western hemlock-------	91	Western hemlock-------	130	Western hemlock-------	200	50
Reichel-------------	Douglas fir-----------	100	Douglas fir-----------	131	Douglas fir-----------	132	70
	Western hemlock-------	98	Western hemlock-------	138	Western hemlock-------	214	50
207:							
Stahl---------------	Western hemlock-------	91	Western hemlock-------	130	Western hemlock-------	200	50
	Douglas fir-----------	95	Douglas fir-----------	124	Douglas fir-----------	121	50
Rock outcrop.							
208, 209, 210-------- Stella	Douglas fir-----------	130	Douglas fir-----------	173	Douglas fir-----------	183	60
212, 213------------- Swem	Douglas fir-----------	125	Douglas fir-----------	163	Douglas fir-----------	173	65
	Western hemlock-------	114	Western hemlock-------	161	Western hemlock-------	256	50
214, 215------------- Swift	Douglas fir-----------	96	Douglas fir-----------	129	Douglas fir-----------	128	70
216, 217, 218-------- Swift	Douglas fir-----------	96	Douglas fir-----------	129	Douglas fir-----------	128	70
	Western hemlock-------	83	Western hemlock-------	119	Western hemlock-------	178	50
219, 220:							
Swift---------------	Douglas fir-----------	96	Douglas fir-----------	129	Douglas fir-----------	128	70
	Western hemlock-------	83	Western hemlock-------	119	Western hemlock-------	178	50
Rock outcrop.							
221:							
Swift---------------	Douglas fir-----------	96	Douglas fir-----------	129	Douglas fir-----------	128	70
Rock outcrop.							
222, 223------------- Vader	Douglas fir-----------	122	Douglas fir-----------	162	Douglas fir-----------	172	65
224, 225, 226, 227, 228----------------- Vanson	Noble fir------------	---	Noble fir------------	---	---	---	---
229, 230, 231, 232, 233----------------- Vanson	Western hemlock-------	78	Western hemlock-------	114	Western hemlock-------	168	50
	Douglas fir-----------	77	Douglas fir-----------	102	Douglas fir-----------	86	60

Table 7.--Woodland Productivity--Continued

Map symbol and soil name	Mean site index at 50 years		Mean site index at 100 years		Estimated growth of unmanaged stands at culmination		
	Species	Index	Species	Index	Species	Cubic feet per acre	Age
234, 235------------- Vanson	Western hemlock-------	82	Western hemlock-------	120	Western hemlock-------	180	50
	Douglas fir-----------	96	Douglas fir-----------	127	Douglas fir-----------	125	70
236, 237, 238:							
Vanson--------------	Noble fir------------	---	Noble fir------------	---	---	---	---
Hatchet-------------	Noble fir------------	---	Noble fir------------	---	---	---	---
239, 240, 241:							
Vanson--------------	Western hemlock-------	78	Western hemlock-------	114	Western hemlock-------	168	50
	Douglas fir-----------	77	Douglas fir-----------	102	Douglas fir-----------	86	60
Hatchet-------------	Western hemlock-------	81	Western hemlock-------	118	Western hemlock-------	176	50
	Douglas fir-----------	94	Douglas fir-----------	127	Douglas fir-----------	125	70
242, 243:							
Vanson--------------	Western hemlock-------	78	Western hemlock-------	114	Western hemlock-------	168	50
	Douglas fir-----------	77	Douglas fir-----------	102	Douglas fir-----------	86	60
Rock outcrop.							
244, 245:							
Vanson--------------	Noble fir------------	---	Noble fir------------	---	---	---	---
Rock outcrop.							
246------------------ Voight	Douglas fir-----------	114	Douglas fir-----------	145	Douglas fir-----------	152	60
	Western hemlock-------	105	Western hemlock-------	148	Western hemlock-------	234	50
247------------------ Winston	Douglas fir-----------	125	Douglas fir-----------	164	Douglas fir-----------	174	60
	Western hemlock-------	114	Western hemlock-------	162	Western hemlock-------	258	50
248, 249------------- Wyant	Douglas fir-----------	113	Douglas fir-----------	154	Douglas fir-----------	163	60
250, 251------------- Xana	Douglas fir-----------	85	Douglas fir-----------	110	Douglas fir-----------	98	60
	Western hemlock-------	80	Western hemlock-------	113	Western hemlock-------	166	50
252, 253------------- Xeno	Douglas fir-----------	114	Douglas fir-----------	150	Douglas fir-----------	158	60
	Western hemlock-------	100	Western hemlock-------	140	Western hemlock-------	218	60
254------------------ Xerorthents	Douglas fir-----------	90	Douglas fir-----------	117	Douglas fir-----------	110	60
255, 256, 257-------- Yalelake	Douglas fir-----------	120	Douglas fir-----------	164	Douglas fir-----------	174	60
	Western hemlock-------	110	Western hemlock-------	154	Western hemlock-------	244	50
258------------------ Zenker	Douglas fir-----------	133	Douglas fir-----------	175	Douglas fir-----------	186	60
	Western hemlock-------	122	Western hemlock-------	171	Western hemlock-------	276	50
259------------------ Zenker	Douglas fir-----------	127	Douglas fir-----------	162	Douglas fir-----------	172	65
	Western hemlock-------	122	Western hemlock-------	171	Western hemlock-------	276	50
260------------------ Zymer	Douglas fir-----------	125	Douglas fir-----------	167	Douglas fir-----------	178	60
	Western hemlock-------	110	Western hemlock-------	154	Western hemlock-------	244	50
261:							
Zymer---------------	Douglas fir-----------	125	Douglas fir-----------	125	Douglas fir-----------	178	60
	Western hemlock-------	110	Western hemlock-------	154	Western hemlock-------	244	50
Rock outcrop.							

Table 7.--Woodland Productivity--Continued

Map symbol and soil name	Mean site index at 50 years		Mean site index at 100 years		Estimated growth of unmanaged stands at culmination		
	Species	Index	Species	Index	Species	Cubic feet per acre	Age
262------------------ Zynbar	Douglas fir-----------	123	Douglas fir-----------	161	Douglas fir-----------	171	65
	Western hemlock-------	110	Western hemlock-------	157	Western hemlock-------	249	50

Table 8.--Selected Management Concerns on Woodland

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that data were not available.)

Map symbol and soil name	Physical limitations	Compaction hazard when soil is moist	Displacement hazard when soil is dry	Soil stability	Hazard of soil damage by fire
3:					
Andic Cryumbrepts	Slope	Severe	Slight	Unstable	Slight.
Rock outcrop.					
4:					
Andic Cryumbrepts	Slope	Moderate	Severe	Unstable	Severe.
Rock outcrop.					
6 Astoria	Muddiness	Severe	Slight	Stable	Moderate.
7 Baumgard	Muddiness	Severe	Slight	Stable	Slight.
8 Baumgard	Slope	Severe	Slight	Stable	Slight.
9 Beigle	Muddiness	Severe	Slight	Stable	Slight.
10 Beigle	Slope	Severe	Slight	Stable	Slight.
11 Boistfort	Muddiness	Severe	Slight	Stable	Slight.
12, 13 Buckpeak	Slope	Severe	Slight	Unstable	Slight.
14 Bunker	Muddiness	Severe	Slight	Stable	Moderate.
15 Bunker	Slope	Severe	Slight	Unstable	Moderate.
16 Camas	Muddiness	Severe	Slight	Stable	Slight.
17 Caples	Wetness	Severe	Slight	Stable	Slight.
21, 22, 23 Centralia	Muddiness	Severe	Slight	Stable	Moderate.
24 Cinebar	Muddiness	Moderate	Severe	Stable	Severe.
25, 26, 27 Cinebar	Muddiness	Severe	Slight	Stable	Slight.
28 Cinebar	Slope	Severe	Slight	Stable	Slight.
29 Cinnamon	Muddiness	Moderate	Severe	Stable	Severe.

Table 8.--Selected Management Concerns on Woodland--Continued

Map symbol and soil name	Physical limitations	Compaction hazard when soil is moist	Displacement hazard when soil is dry	Soil stability	Hazard of soil damage by fire
30 Cinnamon	Slope	Moderate	Severe	Stable	Severe.
31 Cinnamon	Slope	Moderate	Severe	Unstable	Severe.
32 Clato	Muddiness	Severe	Slight	Stable	Slight.
33, 34 Coweeman	Muddiness	Severe	Slight	Stable	Slight.
40 Dobbs	Muddiness	Severe	Slight	Stable	Slight.
41 Dobbs	Slope	Severe	Slight	Unstable	Slight.
42 Domell	Muddiness	Moderate	Severe	Stable	Severe.
43 Domell	Muddiness	Severe	Moderate	Stable	Slight.
44 Domell	Slope	Severe	Moderate	Stable	Slight.
45 Domell	Muddiness	Severe	Moderate	Stable	Slight.
46 Domell	Slope	Severe	Moderate	Stable	Slight.
47 Edgewick	Muddiness	Severe	Slight	Stable	Slight.
48 Elkprairie	Winter snowpack	Slight	Severe	Stable	Severe.
49 Elochoman	Muddiness	Severe	Slight	Stable	Slight.
50, 51 Ferteg	Muddiness	Severe	Slight	Stable	Slight.
52 Forsyth	Occasional snowpack.	Slight	Moderate	Stable	Severe.
53 Forsyth	Slope	Slight	Moderate	Unstable	Severe.
54, 55, 56 Germany	Muddiness	Severe	Slight	Stable	Slight.
57 Germany	Slope	Severe	Slight	Stable	Slight.
58, 59 Germany	Muddiness	Severe	Slight	Stable	Slight.
60 Germany	Slope	Severe	Slight	Unstable	Slight.

Table 8.--Selected Management Concerns on Woodland--Continued

Map symbol and soil name	Physical limitations	Compaction hazard when soil is moist	Displacement hazard when soil is dry	Soil stability	Hazard of soil damage by fire
61. Gobar	Muddiness	Severe	Slight	Stable	Slight.
62, 63. Gobar	Slope	Severe	Slight	Unstable	Slight.
64. Gobar	Slope	Severe	Slight	Unstable on slopes of more than 30 percent.	Slight.
65. Godfrey	Wetness	Severe	Slight	Stable	Slight.
66. Greenwater	Slope	Slight	Moderate	Stable	Slight.
67. Greenwater	Muddiness	Moderate	Severe	Stable	Severe.
68. Greenwater	None	Slight	Moderate	Stable	Slight.
69. Greenwater	Muddiness	Severe	Moderate	Stable	Slight.
70. Hatchet	Slope	Slight	Severe	Stable	Severe.
71. Hatchet	Slope	Slight	Severe	Unstable	Severe.
72. Hatchet	Slope	Slight	Severe	Stable	Severe.
73:					
Hatchet	Slope	Slight	Severe	Stable	Severe.
Rock outcrop.					
74, 75:					
Hatchet	Slope	Slight	Severe	Unstable	Severe.
Rock outcrop.					
76, 77. Hazeldell	Muddiness	Severe	Slight	Stable	Slight.
78. Hazeldell	Slope	Severe	Slight	Stable	Slight.
79. Hazeldell	Muddiness	Severe	Slight	Stable	Slight.
80. Hazeldell	Slope	Severe	Slight	Unstable	Slight.
83. Hoffstadt	Occasional snowpack.	Slight	Severe	Stable	Severe.
84. Hoffstadt	Slope	Slight	Severe	Stable	Severe.

Table 8.--Selected Management Concerns on Woodland--Continued

Map symbol and soil name	Physical limitations	Compaction hazard when soil is moist	Displacement hazard when soil is dry	Soil stability	Hazard of soil damage by fire
85 Hoffstadt	Occasional snowpack.	Slight	Moderate	Stable	Moderate.
86 Hoffstadt	Slope	Slight	Moderate	Stable	Moderate.
87:					
Hoffstadt	Slope	Slight	Moderate	Stable	Moderate.
Rock outcrop.					
88:					
Hoffstadt	Slope	Slight	Moderate	Unstable	Moderate.
Rock outcrop.					
89:					
Hoffstadt	Slope	Slight	Severe	Stable	Severe.
Rock outcrop.					
90:					
Hoffstadt	Slope	Slight	Severe	Unstable	Severe.
Rock outcrop.					
91 Jonas	Muddiness	Severe	Slight	Stable	Slight.
92 Jonas	Slope	Severe	Slight	Stable	Slight.
93 Kalama	Muddiness	Severe	Slight	Stable	Moderate.
94 Kalama	Muddiness	Severe	Slight	Unstable	Moderate.
95 Kalama	Slope	Severe	Slight	Unstable	Moderate.
96, 97 Katula	Slope	Slight	Slight	Unstable	Slight.
98, 99:					
Katula	Slope	Slight	Slight	Unstable	Slight.
Bunker	Slope	Severe	Slight	Unstable	Moderate.
100, 101 Kelso	Muddiness	Severe	Slight	Stable	Slight.
102 Kelso	Muddiness	Severe	Slight	Unstable	Slight.
103 Kelso	Slope	Severe	Slight	Unstable	Slight.
104 Kosmos	Muddiness	Severe	Slight	Stable	Slight.

Table 8.--Selected Management Concerns on Woodland--Continued

Map symbol and soil name	Physical limitations	Compaction hazard when soil is moist	Displacement hazard when soil is dry	Soil stability	Hazard of soil damage by fire
105: Lacamas	Wetness	Severe	Slight	Stable	Slight.
106: Lates	Muddiness	Severe	Slight	Stable	Slight.
107: Lates	Slope	Severe	Slight	Unstable	Slight.
108:					
Lates	Slope	Severe	Slight	Unstable	Slight.
Rock outcrop.					
109: Lithic Haplumbrepts	Slope	Severe	Moderate	Unstable	Moderate.
111: Lonestar	Slope	Moderate	Severe	Stable	Severe.
112: Lonestar	Winter snowpack	Moderate	Severe	Stable	Severe.
113: Lonestar	Slope	Moderate	Severe	Stable	Severe.
114: Lonestar	Slope	Moderate	Severe	Unstable	Severe.
115: Lonestar	Winter snowpack	Moderate	Severe	Stable	Severe.
116: Lonestar	Slope	Moderate	Severe	Stable	Severe.
117: Lonestar	Slope	Moderate	Severe	Unstable	Severe.
118: Lonestar	Winter snowpack	Moderate	Severe	Stable	Severe.
119: Loper	Muddiness	Severe	Slight	Stable	Slight.
120: Loper	Slope	Severe	Slight	Unstable	Slight.
121: Lytell	Muddiness	Severe	Slight	Stable	Slight.
122: Lytell	Slope	Severe	Slight	Unstable	Slight.
123, 124, 125: Mart	Muddiness	Severe	Slight	Stable	Slight.
126: Mart	Slope	Severe	Slight	Stable	Slight.
127: Maytown	Muddiness	Severe	Slight	Stable	Slight.

Table 8.--Selected Management Concerns on Woodland--Continued

Map symbol and soil name	Physical limitations	Compaction hazard when soil is moist	Displacement hazard when soil is dry	Soil stability	Hazard of soil damage by fire
128, 129 Melbourne	Muddiness	Severe	Slight	Stable	Slight.
130 Minniece	Wetness	Severe	Slight	Stable	Slight.
132 Mulholland	Muddiness	Severe	Slight	Stable	Slight.
133 Murnen	Muddiness	Severe	Slight	Stable	Slight.
134 Natal	Wetness	Severe	Slight	Stable	Slight.
135 Newaukum	Muddiness	Severe	Slight	Stable	Slight.
136 Newaukum	Slope	Severe	Slight	Stable	Slight.
137 Newaukum	Muddiness	Severe	Slight	Stable	Slight.
138 Newaukum	Slope	Severe	Slight	Stable	Slight.
139 Newaukum	Slope	Severe	Slight	Unstable	Slight.
140:					
Newaukum	Slope	Severe	Slight	Stable	Slight.
Rock outcrop.					
141 Newberg	Muddiness	Severe	Slight	Stable	Slight.
142, 143, 144 Olequa	Muddiness	Severe	Slight	Stable	Slight.
145 Olequa	Slope	Severe	Slight	Stable	Slight.
146, 147, 148 Olympic	Muddiness	Severe	Slight	Stable	Slight.
149 Olympic	Slope	Severe	Slight	Stable	Slight.
150 Olympic	Muddiness	Severe	Slight	Stable	Slight.
153 Pheeney	Muddiness	Severe	Slight	Stable	Slight.
154 Pheeney	Slope	Severe	Slight	Stable	Slight.
155 Pheeney	Slope	Severe	Slight	Unstable	Slight.

Table 8.--Selected Management Concerns on Woodland--Continued

Map symbol and soil name	Physical limitations	Compaction hazard when soil is moist	Displacement hazard when soil is dry	Soil stability	Hazard of soil damage by fire
156:					
Pheeney	Muddiness	Severe	Slight	Stable	Slight.
Beigle	Muddiness	Severe	Slight	Stable	Slight.
157:					
Pheeney	Slope	Severe	Slight	Stable	Slight.
Beigle	Slope	Severe	Slight	Stable	Slight.
158:					
Pheeney	Slope	Severe	Slight	Stable	Slight.
Rock outcrop.					
159:					
Pheeney	Slope	Severe	Slight	Unstable	Slight.
Rock outcrop.					
160 Pilchuck	None	Slight	Moderate	Stable	Slight.
162 Polepatch	Winter snowpack	Slight	Severe	Stable	Severe.
163 Polepatch	Winter snowpack	Slight	Slight	Stable	Moderate.
164 Polepatch	Slope	Slight	Slight	Unstable	Moderate.
165 Polepatch	Winter snowpack	Slight	Slight	Stable	Moderate.
166, 167 Prather	Muddiness	Moderate	Slight	Stable	Slight.
168 Raught	Muddiness	Severe	Slight	Stable	Slight.
169 Raught	Slope	Severe	Slight	Stable	Slight.
170 Raught	Slope	Severe	Slight	Unstable	Slight.
171 Reichel	Winter snowpack, muddiness.	Severe	Slight	Stable	Slight.
174, 175 Rose Valley	Muddiness	Severe	Slight	Stable	Slight.
176, 177, 178 Salkum	Muddiness	Severe	Slight	Stable	Slight.
179, 180, 181, 182 Sara	Muddiness	Severe	Slight	Stable	Slight.
183 Sarazan	Occasional snowpack.	Slight	Slight	Stable	Slight.

Table 8.--Selected Management Concerns on Woodland--Continued

Map symbol and soil name	Physical limitations	Compaction hazard when soil is moist	Displacement hazard when soil is dry	Soil stability	Hazard of soil damage by fire
184 Sarazan	Slope	Slight	Slight	Unstable	Slight.
185, 186, 187 Sauvola	Muddiness	Severe	Slight	Stable	Slight.
188 Schneider	None	Slight	Slight	Stable	Slight.
189 Schneider	Slope	Slight	Slight	Stable	Slight.
190:					
Schneider	Slope	Slight	Slight	Stable	Slight.
Rock outcrop.					
191:					
Schneider	Slope	Slight	Slight	Unstable	Slight.
Rock outcrop.					
192, 193, 194 Seaquest	Muddiness	Severe	Slight	Stable	Slight.
196 Siouxon	None	Slight	Slight	Stable	Slight.
197 Siouxon	Slope	Slight	Slight	Stable	Slight.
198:					
Siouxon	Slope	Slight	Slight	Unstable	Slight.
Rock outcrop.					
199 Snohomish	Wetness	Severe	Slight	Stable	Moderate.
200 Solo	None	Slight	Severe	Stable	Severe.
201 Speelyai	None	Slight	Moderate	Stable	Moderate.
202 Speelyai	Slope	Slight	Moderate	Unstable	Moderate.
203 Spodic Cryopsamments	Winter snowpack	Slight	Severe	Stable	Severe.
204 Stahl	Slope	Slight	Slight	Stable	Slight.
205:					
Stahl	Winter snowpack	Slight	Slight	Stable	Slight.
Reichel	Winter snowpack	Severe	Slight	Stable	Slight.
206:					
Stahl	Slope	Slight	Slight	Stable	Slight.

Table 8.--Selected Management Concerns on Woodland--Continued

Map symbol and soil name	Physical limitations	Compaction hazard when soil is moist	Displacement hazard when soil is dry	Soil stability	Hazard of soil damage by fire
206:					
Reichel	Slope	Severe	Slight	Stable	Slight.
207:					
Stahl	Slope	Slight	Slight	Stable	Slight.
Rock outcrop.					
208, 209, 210 Stella	Muddiness	Severe	Slight	Stable	Slight.
212 Swem	Muddiness	Severe	Slight	Stable	Slight.
213 Swem	Slope	Severe	Slight	Unstable	Slight.
214 Swift	Slope	Moderate	Severe	Stable	Severe.
215 Swift	Slope	Moderate	Severe	Unstable	Severe.
216 Swift	Muddiness	Moderate	Moderate	Stable	Moderate.
217 Swift	Slope	Moderate	Moderate	Stable	Moderate.
218 Swift	Slope	Moderate	Moderate	Stable	Moderate.
219:					
Swift	Slope	Moderate	Moderate	Stable	Moderate.
Rock outcrop.					
220:					
Swift	Slope	Moderate	Moderate	Unstable	Moderate.
Rock outcrop.					
221:					
Swift	Slope	Moderate	Severe	Unstable	Severe.
Rock outcrop.					
222 Vader	Muddiness	Severe	Slight	Stable	Moderate.
223 Vader	Slope	Severe	Slight	Unstable	Moderate.
224 Vanson	Winter snowpack	Moderate	Severe	Stable	Severe.
225 Vanson	Slope	Moderate	Severe	Stable	Severe.
226 Vanson	Slope	Moderate	Severe	Unstable	Severe.

Table 8.--Selected Management Concerns on Woodland--Continued

Map symbol and soil name	Physical limitations	Compaction hazard when soil is moist	Displacement hazard when soil is dry	Soil stability	Hazard of soil damage by fire
227 Vanson	Winter snowpack	Moderate	Severe	Stable	Severe.
228 Vanson	Slope	Moderate	Severe	Stable	Severe.
229 Vanson	Winter snowpack	Moderate	Severe	Stable	Severe.
230 Vanson	Slope	Moderate	Severe	Stable	Severe.
231 Vanson	Slope	Moderate	Severe	Unstable	Severe.
232 Vanson	Winter snowpack	Moderate	Severe	Stable	Severe.
233 Vanson	Slope	Moderate	Severe	Stable	Severe.
234 Vanson	Winter snowpack	Moderate	Moderate	Stable	Moderate.
235 Vanson	Slope	Moderate	Moderate	Stable	Moderate.
236:					
Vanson	Winter snowpack	Moderate	Severe	Stable	Severe.
Hatchet	Winter snowpack	Slight	Severe	Stable	Severe.
237:					
Vanson	Slope	Moderate	Severe	Stable	Severe.
Hatchet	Slope	Slight	Severe	Stable	Severe.
238:					
Vanson	Slope	Moderate	Severe	Unstable	Severe.
Hatchet	Slope	Slight	Severe	Unstable	Severe.
239:					
Vanson	Winter snowpack	Moderate	Severe	Stable	Severe.
Hatchet	Winter snowpack	Slight	Severe	Stable	Severe.
240:					
Vanson	Slope	Moderate	Severe	Stable	Severe.
Hatchet	Slope	Slight	Severe	Stable	Severe.
241:					
Vanson	Slope	Moderate	Severe	Unstable	Severe.
Hatchet	Slope	Slight	Severe	Unstable	Severe.
242:					
Vanson	Slope	Moderate	Severe	Stable	Severe.
Rock outcrop.					

Table 8.--Selected Management Concerns on Woodland--Continued

Map symbol and soil name	Physical limitations	Compaction hazard when soil is moist	Displacement hazard when soil is dry	Soil stability	Hazard of soil damage by fire
243:					
Vanson	Slope	Moderate	Severe	Unstable	Severe.
Rock outcrop.					
244:					
Vanson	Slope	Moderate	Severe	Stable	Severe.
Rock outcrop.					
245:					
Vanson	Slope	Moderate	Severe	Unstable	Severe.
Rock outcrop.					
246 Voight	Muddiness	Severe	Slight	Stable	Slight.
247 Winston	Muddiness	Severe	Slight	Stable	Moderate.
248 Wyant	Muddiness	Severe	Slight	Stable	Slight.
249 Wyant	Slope	Severe	Slight	Unstable	Slight.
250 Xana	Winter snowpack	Slight	Severe	Stable	Severe.
251 Xana	Slope	Slight	Severe	Unstable	Severe.
252 Xeno	Muddiness	Severe	Slight	Stable	Slight.
253 Xeno	Slope	Severe	Slight	Unstable	Slight.
254 Xerorthents	Slope	Slight	Moderate	Unstable	Moderate.
255 Yalelake	Muddiness	Moderate	Moderate	Stable	Slight.
256 Yalelake	Slope	Moderate	Moderate	Stable	Slight.
257 Yalelake	Slope	Moderate	Moderate	Unstable	Slight.
258 Zenker	Slope	Severe	Slight	Unstable	Slight.
259 Zenker	Slope	Severe	Slight	Unstable	Slight.
260 Zymer	Slope	Moderate	Moderate	Stable	Slight.
261:					
Zymer	Slope	Moderate	Moderate	Unstable	Slight.

Table 8.--Selected Management Concerns on Woodland--Continued

Map symbol and soil name	Physical limitations	Compaction hazard when soil is moist	Displacement hazard when soil is dry	Soil stability	Hazard of soil damage by fire
261:					
Rock outcrop.					
262 Zynbar	Muddiness	Severe	Slight	Stable	Slight.

Table 9.--Woodland Road Construction

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that data were not available.)

Map symbol and soil name	Condition of unsurfaced roads and skid trails during wet periods	Availability of rock for roads	Hazard of cut and fill erosion
3:			
Andic Cryumbrepts	Soft	Readily	Severe.
Rock outcrop.			
4:			
Andic Cryumbrepts	Soft	Readily	Severe.
Rock outcrop.			
6 Astoria	Soft, slippery	Not readily	Slight.
7 Baumgard	Soft	Readily	Slight.
8 Baumgard	Soft	Readily	Moderate.
9 Beigle	Soft, slippery	Readily	Slight.
10 Beigle	Soft, slippery	Readily	Moderate.
11 Boistfort	Soft, slippery	Readily	Slight.
12 Buckpeak	Soft	Not readily	Moderate.
13 Buckpeak	Soft	Not readily	Severe.
14 Bunker	Soft, slippery	Readily	Slight.
15 Bunker	Soft, slippery	Readily	Moderate.
16 Camas	Soft	Readily	Slight.
17 Caples	Soft, sticky	Not readily	Slight.
21, 22, 23 Centralia	Soft	Not readily	Slight.
24 Cinebar	Soft	Not readily	Moderate.
25, 26, 27 Cinebar	Soft, slippery	Not readily	Slight.
28 Cinebar	Soft, slippery	Not readily	Moderate.

Table 9.--Woodland Road Construction--Continued

Map symbol and soil name	Condition of unsurfaced roads and skid trails during wet periods	Availability of rock for roads	Hazard of cut and fill erosion
29 Cinnamon	Soft	Not readily	Slight.
30 Cinnamon	Soft	Not readily	Moderate.
31 Cinnamon	Soft	Not readily	Severe.
32 Clato	Soft	Not readily	Slight.
33 Coweeman	Soft	Not readily	Slight.
34 Coweeman	Soft, sticky	Not readily	Slight.
40 Dobbs	Soft, slippery	Not readily	Slight.
41 Dobbs	Soft, slippery	Not readily	Moderate.
42 Domell	Soft	Not readily	Moderate.
43 Domell	Soft, slippery	Not readily	Slight.
44 Domell	Soft, slippery	Not readily	Moderate.
45 Domell	Soft, slippery	Not readily	Slight.
46 Domell	Soft, slippery	Not readily	Moderate.
47 Edgewick	Soft	Not readily	Slight.
48 Elkprairie	Firm	Not readily	Moderate.
49 Elochoman	Soft, slippery	Not readily	Slight.
50, 51 Ferteg	Soft, slippery	Not readily	Slight.
52 Forsyth	Firm	Readily	Slight.
53 Forsyth	Firm	Readily	Severe.
54, 55, 56 Germany	Soft, slippery	Readily	Slight.
57 Germany	Soft, slippery	Readily	Moderate.

Table 9.--Woodland Road Construction--Continued

Map symbol and soil name	Condition of unsurfaced roads and skid trails during wet periods	Availability of rock for roads	Hazard of cut and fill erosion
58, 59 Germany	Soft, slippery	Not readily	Slight.
60 Germany	Soft, slippery	Not readily	Moderate.
61 Gobar	Soft, slippery	Not readily	Slight.
62 Gobar	Soft, slippery	Not readily	Moderate.
63 Gobar	Soft, slippery	Not readily	Severe.
64 Gobar	Soft, slippery	Not readily	Slight on slopes of less than 30 percent; moderate on slopes of 30 to 45 percent.
65 Godfrey	Soft	Not readily	Slight.
66 Greenwater	Firm	Not readily	Slight on slopes of less than 30 percent; moderate on slopes of 30 to 45 percent.
67 Greenwater	Soft	Not readily	Slight.
68 Greenwater	Firm	Not readily	Slight.
69 Greenwater	Soft	Not readily	Slight.
70, 71 Hatchet	Slippery	Readily	Severe.
72 Hatchet	Slippery	Readily	Moderate.
73:			
Hatchet	Slippery	Readily	Moderate.
Rock outcrop.			
74, 75:			
Hatchet	Slippery	Readily	Severe.
Rock outcrop.			
76, 77 Hazeldell	Soft	Readily	Slight.
78 Hazeldell	Soft	Readily	Moderate.
79 Hazeldell	Soft	Not readily	Slight.

Table 9.--Woodland Road Construction--Continued

Map symbol and soil name	Condition of unsurfaced roads and skid trails during wet periods	Availability of rock for roads	Hazard of cut and fill erosion
80 Hazeldell	Soft	Not readily	Moderate.
83 Hoffstadt	Slippery	Readily	Moderate.
84 Hoffstadt	Slippery	Readily	Severe.
85 Hoffstadt	Slippery	Readily	Slight.
86 Hoffstadt	Slippery	Readily	Moderate.
87:			
Hoffstadt	Slippery	Readily	Moderate.
Rock outcrop.			
88, 89, 90:			
Hoffstadt	Slippery	Readily	Severe.
Rock outcrop.			
91 Jonas	Soft, slippery	Readily	Slight.
92 Jonas	Soft, slippery	Readily	Moderate.
93, 94 Kalama	Soft	Not readily	Slight.
95 Kalama	Soft	Not readily	Moderate.
96 Katula	Slippery	Readily	Moderate.
97 Katula	Slippery	Readily	Severe.
98:			
Katula	Slippery	Readily	Moderate.
Bunker	Soft, slippery	Readily	Moderate.
99:			
Katula	Slippery	Readily	Severe.
Bunker	Soft, slippery	Readily	Severe.
100, 101, 102 Kelso	Soft	Not readily	Slight.
103 Kelso	Soft	Not readily	Moderate.
104 Kosmos	Soft	Not readily	Slight.

Table 9.--Woodland Road Construction--Continued

Map symbol and soil name	Condition of unsurfaced roads and skid trails during wet periods	Availability of rock for roads	Hazard of cut and fill erosion
105: Lacamas	Soft	Not readily	Slight.
106: Lates	Soft, slippery	Readily	Slight.
107: Lates	Soft, slippery	Readily	Moderate.
108:			
Lates	Soft, slippery	Readily	Severe.
Rock outcrop.			
109: Lithic Haplumbrepts	Soft	Readily	Severe.
111, 112: Lonestar	Soft	Not readily	Moderate.
113, 114: Lonestar	Soft	Not readily	Severe.
115: Lonestar	Soft	Not readily	Slight.
116: Lonestar	Soft	Not readily	Moderate.
117: Lonestar	Soft	Not readily	Severe.
118: Lonestar	Soft	Not readily	Slight.
119: Loper	Soft, slippery	Not readily	Slight.
120: Loper	Soft, slippery	Not readily	Moderate.
121: Lytell	Soft, slippery	Not readily	Slight.
122: Lytell	Soft, slippery	Not readily	Moderate.
123, 124, 125: Mart	Soft	Not readily	Slight.
126: Mart	Soft	Not readily	Moderate.
127: Maytown	Soft	Not readily	Slight.
128, 129: Melbourne	Soft	Not readily	Slight.
130: Minniece	Soft	Not readily	Slight.

Table 9.--Woodland Road Construction--Continued

Map symbol and soil name	Condition of unsurfaced roads and skid trails during wet periods	Availability of rock for roads	Hazard of cut and fill erosion
132 Mulholland	Soft, slippery	Not readily	Slight.
133 Murnen	Soft, slippery	Readily	Slight.
134 Natal	Soft, sticky	Not readily	Slight.
135 Newaukum	Soft, slippery	Not readily	Slight.
136 Newaukum	Soft, slippery	Not readily	Moderate.
137 Newaukum	Soft, slippery	Not readily	Slight.
138 Newaukum	Soft, slippery	Not readily	Moderate.
139 Newaukum	Soft, slippery	Not readily	Severe.
140:			
Newaukum	Soft, slippery	Not readily	Slight on slopes of less than 30 percent; moderate on slopes of 30 to 65 percent.
Rock outcrop.			
141 Newberg	Soft	Not readily	Slight.
142, 143, 144 Olequa	Soft	Not readily	Slight.
145 Olequa	Soft	Not readily	Moderate.
146, 147, 148 Olympic	Soft	Readily	Slight.
149 Olympic	Soft	Readily	Moderate.
150 Olympic	Soft	Not readily	Slight.
153 Pheeney	Soft, slippery	Readily	Slight.
154 Pheeney	Soft, slippery	Readily	Moderate.
155 Pheeney	Soft, slippery	Readily	Severe.
156:			
Pheeney	Soft, slippery	Readily	Slight.

Table 9.--Woodland Road Construction--Continued

Map symbol and soil name	Condition of unsurfaced roads and skid trails during wet periods	Availability of rock for roads	Hazard of cut and fill erosion
156:			
Beigle	Soft, slippery	Readily	Slight.
157:			
Pheeney	Soft, slippery	Readily	Moderate.
Beigle	Soft, slippery	Readily	Moderate.
158:			
Pheeney	Soft, slippery	Readily	Moderate.
Rock outcrop.			
159:			
Pheeney	Soft, slippery	Readily	Severe.
Rock outcrop.			
160 Pilchuck	Firm	Not readily	Slight.
162 Polepatch	Slippery	Readily	Moderate.
163 Polepatch	Firm	Readily	Slight.
164 Polepatch	Firm	Readily	Severe.
165 Polepatch	Firm	Readily	Slight.
166, 167 Prather	Soft, sticky	Not readily	Slight.
168 Raught	Soft, slippery	Readily	Slight.
169 Raught	Soft, slippery	Readily	Moderate.
170 Raught	Soft, slippery	Readily	Severe.
171 Reichel	Soft, slippery	Readily	Slight.
174, 175 Rose Valley	Soft	Not readily	Slight.
176, 177, 178 Salkum	Soft, sticky	Not readily	Slight.
179, 180, 181 Sara	Soft	Not readily	Slight.
182 Sara	Soft, sticky	Not readily	Slight.
183 Sarazan	Slippery	Not readily	Slight.

Table 9.--Woodland Road Construction--Continued

Map symbol and soil name	Condition of unsurfaced roads and skid trails during wet periods	Availability of rock for roads	Hazard of cut and fill erosion
184 Sarazan	Slippery	Not readily	Moderate.
185, 186, 187 Sauvola	Soft	Not readily	Slight.
188 Schneider	Slippery	Readily	Slight.
189 Schneider	Slippery	Readily	Moderate.
190:			
Schneider	Slippery	Readily	Slight on slopes of less than 30 percent; moderate on slopes of 30 to 65 percent.
Rock outcrop.			
191:			
Schneider	Slippery	Readily	Severe.
Rock outcrop.			
192, 193, 194 Seaquest	Soft	Not readily	Slight.
196 Siouxon	Slippery	Readily	Slight.
197 Siouxon	Slippery	Readily	Moderate.
198:			
Siouxon	Slippery	Readily	Severe.
Rock outcrop.			
199 Snohomish	Soft, sticky	Not readily	Slight.
200 Solo	Firm	Not readily	Slight.
201 Speelyai	Firm	Not readily	Slight.
202 Speelyai	Firm	Not readily	Slight on slopes of less than 30 percent; moderate on slopes of 30 to 60 percent.
203 Spodic Cryopsamments	Firm	Not readily	Slight.
204 Stahl	Slippery	Readily	Moderate.
205:			
Stahl	Soft, slippery	Readily	Slight.

Table 9.--Woodland Road Construction--Continued

Map symbol and soil name	Condition of unsurfaced roads and skid trails during wet periods	Availability of rock for roads	Hazard of cut and fill erosion
205:			
Reichel	Soft, slippery	Readily	Slight.
206:			
Stahl	Soft, slippery	Readily	Moderate.
Reichel	Soft, slippery	Readily	Moderate.
207:			
Stahl	Slippery	Readily	Moderate.
Rock outcrop.			
208, 209, 210 Stella	Soft	Not readily	Slight.
212 Swem	Soft, slippery	Not readily	Slight.
213 Swem	Soft, slippery	Not readily	Slight or moderate.
214, 215 Swift	Soft	Readily	Severe.
216 Swift	Soft	Readily	Slight.
217, 218 Swift	Soft	Readily	Moderate.
219:			
Swift	Soft	Readily	Moderate.
Rock outcrop.			
220, 221:			
Swift	Soft	Readily	Severe.
Rock outcrop.			
222 Vader	Soft	Not readily	Slight.
223 Vader	Soft	Not readily	Moderate.
224 Vanson	Soft	Readily	Moderate.
225, 226 Vanson	Soft	Readily	Severe.
227 Vanson	Soft	Not readily	Moderate.
228 Vanson	Soft	Not readily	Severe.
229 Vanson	Soft	Readily	Slight.

Table 9.--Woodland Road Construction--Continued

Map symbol and soil name	Condition of unsurfaced roads and skid trails during wet periods	Availability of rock for roads	Hazard of cut and fill erosion
230 Vanson	Soft	Readily	Moderate.
231 Vanson	Soft	Readily	Severe.
232 Vanson	Soft	Not readily	Slight.
233 Vanson	Soft	Not readily	Moderate.
234 Vanson	Soft	Not readily	Slight.
235 Vanson	Soft	Not readily	Moderate.
236:			
Vanson	Soft	Readily	Moderate.
Hatchet	Soft	Readily	Moderate.
237, 238:			
Vanson	Soft	Readily	Severe.
Hatchet	Soft	Readily	Severe.
239:			
Vanson	Soft, slippery	Readily	Slight.
Hatchet	Soft, slippery	Readily	Slight.
240:			
Vanson	Soft, slippery	Readily	Moderate.
Hatchet	Soft, slippery	Readily	Moderate.
241:			
Vanson	Soft, slippery	Readily	Severe.
Hatchet	Soft, slippery	Readily	Severe.
242:			
Vanson	Soft	Readily	Moderate.
Rock outcrop.			
243:			
Vanson	Soft	Readily	Severe.
Rock outcrop.			
244, 245:			
Vanson	Soft	Readily	Severe.
Rock outcrop.			
246 Voight	Soft	Not readily	Slight.
247 Winston	Soft, slippery	Readily	Slight.

Table 9.--Woodland Road Construction--Continued

Map symbol and soil name	Condition of unsurfaced roads and skid trails during wet periods	Availability of rock for roads	Hazard of cut and fill erosion
248 Wyant	Soft	Not readily	Slight.
249 Wyant	Soft	Not readily	Moderate.
250 Xana	Firm	Not readily	Slight.
251 Xana	Firm	Not readily	Moderate.
252 Xeno	Soft, slippery	Not readily	Slight.
253 Xeno	Soft, slippery	Not readily	Moderate.
254 Xerorthents	Firm	Not readily	Severe.
255 Yalelake	Soft, slippery	Not readily	Slight.
256, 257 Yalelake	Soft, slippery	Not readily	Moderate.
258 Zenker	Soft, slippery	Not readily	Moderate.
259 Zenker	Soft, slippery	Not readily	Severe.
260 Zymer	Soft	Readily	Moderate.
261 Zymer	Soft	Readily	Severe.
Rock outcrop.			
262 Zynbar	Soft, slippery	Not readily	Slight.

Table 10.--Recreational Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1:					
Andaquepts	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
2:					
Andic Cryaquepts	Severe: slope, wetness.	Severe: slope, wetness.	Severe: slope, small stones, wetness.	Severe: slope, wetness.	Severe: slope, wetness.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope,	Severe: slope, depth to rock, droughty.
3:					
Andic Cryumbrepts	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
4:					
Andic Cryumbrepts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
5:					
Arents	Severe: small stones.	Severe: small stones.	Severe: small stones.	Slight	Severe: small stones, droughty.
6:					
Astoria	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
7:					
Baumgard	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
8:					
Baumgard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
9:					
Beigle	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
10:					
Beigle	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
11:					
Boistfort	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
12:					
Buckpeak	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
13:					
Buckpeak	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
14:					
Bunker	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
15:					
Bunker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
16:					
Camas	Severe: flooding.	Moderate: dusty, large stones, small stones.	Severe: large stones, small stones.	Moderate: dusty, large stones.	Severe: large stones.
17:					
Caples	Severe: flooding.	Moderate: percs slowly, wetness.	Moderate: percs slowly, wetness.	Moderate: wetness.	Moderate: wetness.
18:					
Carrolls	Severe: flooding, too sandy, ponding.	Severe: too sandy, ponding.	Severe: flooding, too sandy, ponding.	Severe: too sandy, ponding.	Severe: flooding, ponding.
19:					
Carrolls	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
20:					
Carrolls	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
21:					
Centralia	Moderate: dusty.	Moderate: dusty.	Moderate: dusty, slope.	Moderate: dusty.	Slight.
22:					
Centralia	Moderate: dusty, slope.	Moderate: dusty, slope.	Severe: slope.	Moderate: dusty.	Moderate: slope.
23:					
Centralia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
24:					
Cinebar	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
25:					
Cinebar----------------	Moderate: dusty.	Moderate: dusty.	Moderate: dusty, slope, small stones.	Moderate: dusty.	Slight.
26:					
Cinebar----------------	Moderate: dusty, slope.	Moderate: dusty, slope.	Severe: slope.	Moderate: dusty.	Moderate: slope.
27:					
Cinebar----------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
28:					
Cinebar----------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
29:					
Cinnamon---------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
30:					
Cinnamon---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
31:					
Cinnamon---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
32:					
Clato------------------	Severe: flooding.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Slight.
33:					
Coweeman---------------	Severe: wetness.	Moderate: percs slowly, slope, wetness.	Severe: slope, wetness.	Severe: erodes easily.	Moderate: slope, wetness.
34:					
Coweeman---------------	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Moderate: slope, wetness.	Severe: slope.
35:					
Cowlitz----------------	Severe: flooding, small stones, too sandy.	Severe: small stones, too sandy.	Severe: small stones, too sandy.	Severe: small stones, too sandy.	Severe: small stones, droughty.
36:					
Cowlitz----------------	Severe: small stones, too sandy.	Severe: small stones, too sandy.	Severe: small stones, too sandy.	Severe: small stones, too sandy.	Severe: small stones, droughty.
37:					
Cowlitz----------------	Severe: small stones, too sandy.	Severe: small stones, too sandy.	Severe: slope, small stones, too sandy.	Severe: small stones, too sandy.	Severe: small stones, droughty.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
38:					
Cowlitz	Severe: slope, small stones, too sandy.	Severe: slope, small stones, too sandy.	Severe: slope, small stones, too sandy.	Severe: small stones, too sandy.	Severe: slope, small stones, droughty.
39:					
Delameter	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: large stones, small stones, droughty.
40:					
Dobbs	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
41:					
Dobbs	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
42:					
Domell	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
43:					
Domell	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
44:					
Domell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
45:					
Domell	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
46:					
Domell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
47:					
Edgewick	Severe: flooding.	Slight	Moderate: flooding, small stones.	Slight	Moderate: flooding, droughty.
48:					
Elkprairie	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too sandy.	Severe: slope.
49:					
Elochoman	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
50:					
Ferteg	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly, slope.	Slight	Slight.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
51:					
Ferteg	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
52:					
Forsyth	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope, too sandy.	Severe: slope, droughty.
53:					
Forsyth	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope, droughty.
54:					
Germany	Slight	Slight	Moderate: slope.	Slight	Slight.
55:					
Germany	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
56:					
Germany	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
57:					
Germany	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
58:					
Germany	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
59:					
Germany	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
60:					
Germany	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
61:					
Gobar	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
62:					
Gobar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
63:					
Gobar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
64:					
Gobar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
65:					
Godfrey	Severe: flooding, percs slowly, wetness.	Severe: percs slowly, wetness.	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.
66:					
Greenwater	Severe: flooding, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
67:					
Greenwater	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
68:					
Greenwater	Severe: flooding.	Moderate: small stones, too sandy.	Severe: small stones.	Moderate: too sandy.	Moderate: small stones, droughty.
69:					
Greenwater	Severe: flooding.	Slight	Moderate: slope, small stones.	Slight	Moderate: droughty.
70:					
Hatchet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
71:					
Hatchet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
72:					
Hatchet	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, small stones.
73:					
Hatchet	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
74:					
Hatchet	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
75:					
Hatchet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
76:					
Hazeldell	Moderate: dusty, slope, small stones.	Moderate: dusty, slope, small stones.	Severe: slope, small stones.	Moderate: dusty.	Moderate: slope, small stones.
77:					
Hazeldell	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
78:					
Hazeldell	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
79:					
Hazeldell	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: dusty, slope.	Severe: slope.
80:					
Hazeldell	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
81:					
Histic Cryaquepts	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.
82:					
Histic Humaquepts	Severe: excess humus, flooding, ponding.	Severe: excess humus, ponding.	Severe: excess humus, flooding, ponding.	Severe: excess humus, ponding.	Severe: excess humus, flooding, ponding.
83:					
Hoffstadt	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope, droughty.
84:					
Hoffstadt	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
85:					
Hoffstadt	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: slope, small stones, droughty.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
86:					
Hoffstadt	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones, droughty.
87:					
Hoffstadt	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones, droughty.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
88:					
Hoffstadt	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones, droughty.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
89:					
Hoffstadt	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
90:					
Hoffstadt	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
91:					
Jonas	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
92:					
Jonas	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
93:					
Kalama	Moderate: dusty, slope, small stones.	Moderate: dusty, slope, small stones.	Severe: slope, small stones.	Moderate: dusty.	Moderate: slope, small stones.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
94:					
Kalama	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: dusty, slope.	Severe: slope.
95:					
Kalama	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
96:					
Katula	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, slope.
97:					
Katula	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, slope.
98:					
Katula	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, slope.
Bunker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
99:					
Katula	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, slope.
Bunker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
100:					
Kelso	Moderate: dusty, wetness.	Moderate: dusty, wetness.	Moderate: dusty, slope, wetness.	Moderate: dusty.	Slight.
101:					
Kelso	Moderate: dusty, slope, wetness.	Moderate: dusty, slope, wetness.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
102:					
Kelso	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
103:					
Kelso	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily, slope.	Severe: slope.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
104:					
Kosmos	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
105:					
Lacamas	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
106:					
Lates	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
107:					
Lates	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
108:					
Lates	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
109:					
Lithic Haplumbrepts	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
110:					
Lithic Umbric Vitrandepts	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight	Severe: depth to rock.
111:					
Lonestar	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope.
112:					
Lonestar	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
113:					
Lonestar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
114:					
Lonestar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
115:					
Lonestar	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
116:					
Lonestar	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
117:					
Lonestar	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
118:					
Lonestar	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
119:					
Loper	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
120:					
Loper	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
121:					
Lytell	Severe: percs slowly, slope.	Severe: percs slowly, slope.	Severe: percs slowly, slope.	Moderate: slope.	Severe: slope.
122:					
Lytell	Severe: percs slowly, slope.	Severe: percs slowly, slope.	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.
123:					
Mart	Moderate: dusty.	Moderate: dusty.	Moderate: dusty, slope, small stones.	Moderate: dusty.	Slight.
124:					
Mart	Moderate: dusty, slope.	Moderate: dusty, slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
125:					
Mart	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily, slope.	Severe: slope.
126:					
Mart	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily, slope.	Severe: slope.
127:					
Maytown	Severe: flooding.	Moderate: dusty.	Moderate: dusty, flooding.	Moderate: dusty.	Moderate: flooding.
128:					
Melbourne	Moderate: dusty, slope.	Moderate: dusty, slope.	Severe: slope.	Moderate: dusty.	Moderate: slope.
129:					
Melbourne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
130:					
Minniece	Severe: percs slowly, wetness.	Severe: percs slowly, wetness.	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.
131:					
Mountsolo	Severe: flooding, too sandy, wetness.	Severe: cemented pan, too sandy, wetness.	Severe: small stones. too sandy, wetness.	Severe: too sandy, wetness.	Severe: cemented pan, wetness.
132:					
Mulholland	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
133:					
Murnen	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
134:					
Natal	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
135:					
Newaukum	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: dusty, slope.	Severe: slope.
136:					
Newaukum	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
137:					
Newaukum	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: dusty, slope.	Severe: slope.
138:					
Newaukum	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
139:					
Newaukum	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
140:					
Newaukum	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
141:					
Newberg	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
142:					
Olequa	Moderate: dusty.	Moderate: dusty.	Moderate: dusty, slope.	Moderate: dusty.	Slight.
143:					
Olequa	Moderate: dusty, slope.	Moderate: dusty, slope.	Severe: slope.	Moderate: dusty.	Moderate: slope.
144:					
Olequa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
145:					
Olequa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
146:					
Olympic	Moderate: dusty.	Moderate: dusty.	Moderate: dusty, slope.	Moderate: dusty.	Slight.
147:					
Olympic	Moderate: dusty, slope.	Moderate: dusty, slope.	Severe: slope.	Moderate: dusty.	Moderate: slope.
148:					
Olympic	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
149:					
Olympic	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
150:					
Olympic	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: dusty, slope.	Severe: slope.
151:					
Panamaker	Severe: flooding, too sandy.	Severe: too sandy.	Severe: small stones, too sandy.	Severe: too sandy.	Moderate: small stones, too sandy, droughty.
152:					
Panamaker	Severe: flooding, too sandy.	Severe: too sandy.	Severe: small stones, too sandy.	Severe: too sandy.	Moderate: flooding, small stones, droughty.
153:					
Pheeney	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: dusty, slope.	Severe: slope.
154:					
Pheeney	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
155:					
Pheeney	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
156:					
Pheeney	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: dusty, slope.	Severe: slope.
Beigle	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
157:					
Pheeney	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Beigle	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
158:					
Pheeney	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
159:					
Pheeney	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
160:					
Pilchuck	Severe: flooding.	Moderate: too sandy.	Moderate: slope, small stones, too sandy.	Moderate: too sandy.	Moderate: droughty.
161:					
Pits	Severe: small stones, too sandy.	Severe: small stones, too sandy.	Severe: small stones, too sandy.	Severe: small stones, too sandy.	Severe: small stones, droughty.
162:					
Polepatch	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too sandy.	Severe: slope, droughty.
163:					
Polepatch	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones, slope, too sandy.	Severe: large stones, small stones, droughty.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
164:					
Polepatch	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, small stones, droughty.
165:					
Polepatch	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Moderate: slope, too sandy.	Severe: slope, small stones, droughty.
166:					
Prather	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.
167:					
Prather	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Moderate: wetness.	Moderate: slope, wetness.
168:					
Raught	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
169:					
Raught	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
170:					
Raught	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
171:					
Reichel	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
172:					
Riverwash	Severe: flooding, too sandy, wetness.	Severe: too sandy, wetness.	Severe: small stones, too sandy, wetness.	Severe: too sandy, wetness.	Severe: flooding, wetness, droughty.
173:					
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
Rubble land	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, small stones, droughty.
174:					
Rose Valley	Severe: wetness.	Moderate: dusty, wetness.	Severe: wetness.	Moderate: dusty, wetness.	Moderate: wetness.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
175:					
Rose Valley------------	Severe: wetness.	Moderate: dusty, slope, wetness.	Severe: slope, wetness.	Severe: erodes easily.	Moderate: slope, wetness.
176:					
Salkum-----------------	Moderate: dusty.	Moderate: dusty.	Moderate: dusty, slope.	Moderate: dusty.	Slight.
177:					
Salkum-----------------	Moderate: dusty, slope.	Moderate: dusty, slope.	Severe: slope.	Moderate: dusty.	Moderate: slope.
178:					
Salkum-----------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
179:					
Sara-------------------	Severe: wetness.	Moderate: dusty, wetness.	Severe: wetness.	Moderate: dusty, wetness.	Moderate: wetness.
180:					
Sara-------------------	Severe: wetness.	Moderate: dusty, slope, wetness.	Severe: slope, wetness.	Moderate: dusty, wetness.	Moderate: slope, wetness.
181:					
Sara-------------------	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope.
182:					
Sara-------------------	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
183:					
Sarazan----------------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: slope, small stones.
184:					
Sarazan----------------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.
185:					
Sauvola----------------	Moderate: dusty, wetness.	Moderate: dusty, wetness.	Moderate: slope, small stones, wetness.	Moderate: dusty, wetness.	Moderate: wetness.
186:					
Sauvola----------------	Moderate: dusty, slope, wetness.	Moderate: dusty, slope, wetness.	Severe: slope.	Moderate: dusty, wetness.	Moderate: slope, wetness.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
187:					
Sauvola	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: dusty, slope, wetness.	Severe: slope.
188:					
Schneider	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: slope, small stones.
189:					
Schneider	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
190:					
Schneider	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
191:					
Schneider	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
192:					
Seaquest	Moderate: dusty.	Moderate: dusty.	Moderate: dusty, slope.	Moderate: dusty.	Slight.
193:					
Seaquest	Moderate: dusty, slope.	Moderate: dusty, slope.	Severe: slope.	Moderate: dusty.	Moderate: slope.
194:					
Seaquest	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
195:					
Semiahmoo	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.
196:					
Siouxon	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Moderate: dusty, large stones, slope.	Severe: large stones, slope, small stones.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
197:					
Siouxon	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, small stones.
198:					
Siouxon	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
199:					
Snohomish	Severe: flooding, wetness.	Moderate: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
200:					
Solo	Moderate: small stones, too sandy, wetness.	Moderate: small stones, too sandy, wetness.	Severe: small stones.	Moderate: too sandy, wetness.	Severe: droughty.
201:					
Speelyai	Severe: cemented pan, wetness.	Severe: cemented pan, wetness.	Severe: cemented pan, small stones, wetness.	Severe: wetness.	Severe: cemented pan, wetness, droughty.
202:					
Speelyai	Severe: cemented pan, slope, wetness.	Severe: cemented pan, slope, wetness.	Severe: slope, small stones, wetness.	Severe: slope, wetness.	Severe: slope, wetness, droughty.
203:					
Spodic Cryopsamments	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too sandy.	Severe: slope.
204:					
Stahl	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
205:					
Stahl	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: slope, small stones.
Reichel	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
206:					
Stahl	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
206:					
Reichel	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
207:					
Stahl	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
208:					
Stella	Moderate: dusty, wetness.	Moderate: dusty, wetness.	Moderate: dusty, slope, wetness.	Moderate: dusty.	Slight.
209:					
Stella	Moderate: dusty, slope, wetness.	Moderate: dusty, slope, wetness.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
210:					
Stella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
211:					
Studebaker	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Moderate: too sandy.	Severe: small stones, droughty.
212:					
Swem	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: large stones, slope.	Severe: large stones, slope.
213:					
Swem	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: large stones, slope.
214:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
215:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
216:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
217:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
218:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
219:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
220:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
221:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
222:					
Vader	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: dusty, slope.	Severe: slope.
223:					
Vader	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
224:					
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
225:					
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
226:					
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
227:					
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
228:					
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
229:					
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
230:					
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
231:					
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
232:					
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
233:					
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
234:					
Vanson	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: slope.	Severe: slope.
235:					
Vanson	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
236:					
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Hatchet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope, droughty.
237:					
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hatchet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
238:					
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hatchet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
239:					
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Hatchet	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: large stones, slope, small stones.
240:					
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
240:					
Hatchet----------------	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, small stones.
241:					
Vanson-----------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hatchet----------------	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, small stones.
242:					
Vanson-----------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop-----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
243:					
Vanson-----------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop-----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
244:					
Vanson-----------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop-----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
245:					
Vanson-----------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop-----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
246:					
Voight-----------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
247:					
Winston----------------	Moderate: dusty.	Moderate: dusty.	Moderate: dusty, slope, small stones.	Moderate: dusty.	Slight.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
248:					
Wyant	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: dusty, slope.	Severe: slope.
249:					
Wyant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
250:					
Xana	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too sandy.	Severe: slope.
251:					
Xana	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
252:					
Xeno	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
253:					
Xeno	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily, slope.	Severe: slope.
254:					
Xerorthents	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
255:					
Yalelake	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
256:					
Yalelake	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
257:					
Yalelake	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
258:					
Zenker	Severe: percs slowly, slope.	Severe: percs slowly, slope.	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.
259:					
Zenker	Severe: percs slowly, slope.	Severe: percs slowly, slope.	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.
260:					
Zymer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
261:					
Zymer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 10.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
261:					
Rock outcrop-----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, droughty.
262:					
Zynbar-----------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
263:					
Water------------------	---	---	---	---	---

Table 11.--Wildlife Habitat

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life
1:											
Andaquepts	Poor	Poor	Fair	Poor	Poor	Fair	Good	Fair	Poor	Poor	Fair
2:											
Andic Cryaquepts	Very poor.	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
3:											
Andic Cryumbrepts	Very poor.	Very poor.	Fair	Poor	Fair	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
4:											
Andic Cryumbrepts	Very poor.	Very poor.	Fair	Poor	Fair	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
5:											
Arents	Poor	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
6:											
Astoria	Fair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
7:											
Baumgard	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
8:											
Baumgard	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
9:											
Beigle	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
10:											
Beigle	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
11:											
Boistfort	Fair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
12:											
Buckpeak	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
13: Buckpeak	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
14: Bunker	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
15: Bunker	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
16: Camas	Fair	Fair	Fair	Poor	Poor	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
17: Caples	Good	Good	Good	Good	Good	Good	Fair	Fair	Fair	Poor	Fair
18: Carrolls	Poor	Fair	Good	Good	Good	Good	Fair	Fair	Fair	Good	Fair
19: Carrolls	Poor	Fair	Good	Good	Good	Good	Fair	Fair	Fair	Good	Fair
20: Carrolls	Poor	Fair	Good	Good	Good	Good	Fair	Fair	Fair	Good	Fair
21: Centralia	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
22: Centralia	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
23: Centralia	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
24: Cinebar	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
25: Cinebar	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
26: Cinebar	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
27: Cinebar	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
28: Cinebar	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
29: Cinnamon	Fair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
30: Cinnamon	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
31: Cinnamon	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
32: Clato	Good	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor
33: Coweeman	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
34: Coweeman	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
35: Cowlitz	Poor	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
36: Cowlitz	Poor	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
37: Cowlitz	Poor	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
38: Cowlitz	Poor	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
39: Delameter	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
40: Dobbs	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
41: Dobbs	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
42: Domell	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
43: Domell	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
44: Domell	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
45: Domell	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
46: Domell	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
47: Edgewick	Fair	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
48: Elkprairie	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
49: Elochoman	Fair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
50: Ferteg	Fair	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
51: Ferteg	Fair	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
52: Forsyth	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
53: Forsyth	Very poor.	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.
54: Germany	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
55: Germany	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
56: Germany	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
57: Germany	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
58: Germany	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
59: Germany	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
60: Germany	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
61: Gobar	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
62: Gobar	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
63: Gobar	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
64: Gobar	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
65: Godfrey	Poor	Poor	Fair	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair
66: Greenwater	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
67: Greenwater	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
68: Greenwater	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
69: Greenwater	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
70: Hatchet	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
71: Hatchet	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
72: Hatchet	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.
73: Hatchet	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life
73:											
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
74:											
Hatchet	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
75:											
Hatchet	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
76:											
Hazeldell	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
77:											
Hazeldell	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
78:											
Hazeldell	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
79:											
Hazeldell	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
80:											
Hazeldell	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
81:											
Histic Cryaquepts	Poor	Poor	Poor	Poor	Fair	Good	Good	Good	Poor	Poor	Good
82:											
Histic Humaquepts	Poor	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
83:											
Hoffstadt	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
84:											
Hoffstadt	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
85:											
Hoffstadt	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
86:											
Hoffstadt	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
87:											
Hoffstadt	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
88:											
Hoffstadt	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
89:											
Hoffstadt	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
90:											
Hoffstadt	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
91:											
Jonas	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
92:											
Jonas	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
93:											
Kalama	Fair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
94:											
Kalama	Fair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
95:											
Kalama	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
96:											
Katula	Very poor.	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
97:											
Katula	Very poor.	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
98:											
Katula	Very poor.	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
98:											
Bunker	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
99:											
Katula	Very poor.	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
Bunker	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
100:											
Kelso	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
101:											
Kelso	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
102:											
Kelso	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
103:											
Kelso	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
104:											
Kosmos	Fair	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
105:											
Lacamas	Poor	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
106:											
Lates	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
107:											
Lates	Very poor.	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
108:											
Lates	Very poor.	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
109:											
Lithic Haplumbrepts	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
110:											
Lithic Umbric Vitrandepts	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
111: Lonestar	Poor	Poor	Good	Fair	Fair	Good	Poor	Very poor.	Poor	Good	Very poor.
112: Lonestar	Poor	Poor	Good	Fair	Fair	Good	Poor	Very poor.	Poor	Good	Very poor.
113: Lonestar	Poor	Poor	Good	Fair	Fair	Good	Poor	Very poor.	Poor	Good	Very poor.
114: Lonestar	Very poor.	Very poor.	Good	Fair	Fair	Good	Poor	Very poor.	Poor	Good	Very poor.
115: Lonestar	Poor	Poor	Good	Fair	Fair	Good	Poor	Very poor.	Poor	Good	Very poor.
116: Lonestar	Poor	Poor	Good	Fair	Fair	Good	Poor	Very poor.	Poor	Good	Very poor.
117: Lonestar	Very poor.	Very poor.	Good	Fair	Fair	Good	Poor	Very poor.	Poor	Good	Very poor.
118: Lonestar	Poor	Poor	Good	Fair	Fair	Good	Poor	Very poor.	Poor	Good	Very poor.
119: Loper	Fair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
120: Loper	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
121: Lytell	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
122: Lytell	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
123: Mart	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
124: Mart	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
125: Mart	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
126: Mart	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
127: Maytown	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
128: Melbourne	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
129: Melbourne	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
130: Minniece	Poor	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Poor	Fair	Fair
131: Mountsolo	Poor	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
132: Mulholland	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
133: Murnen	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
134: Natal	Poor	Fair	Fair	Fair	Fair	Fair	Good	Poor	Fair	Fair	Fair
135: Newaukum	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
136: Newaukum	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
137: Newaukum	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
138: Newaukum	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
139: Newaukum	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
140: Newaukum	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life
141: Newberg	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
142: Olequa	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
143: Olequa	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
144: Olequa	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
145: Olequa	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
146: Olympic	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
147: Olympic	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
148: Olympic	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
149: Olympic	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
150: Olympic	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
151: Panamaker	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
152: Panamaker	Poor	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
153: Pheeney	Poor	Fair	Good	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
154: Pheeney	Poor	Fair	Good	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
155: Pheeney	Very poor.	Very poor.	Good	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
156:											
Pheeney	Poor	Fair	Good	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Beigle	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
157:											
Pheeney	Poor	Fair	Good	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Beigle	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
158:											
Pheeney	Poor	Fair	Good	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
159:											
Pheeney	Very poor.	Very poor.	Good	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
160:											
Pilchuck	Fair	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
161:											
Pits	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
162:											
Polepatch	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
163:											
Polepatch	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
164:											
Polepatch	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
165:											
Polepatch	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
166:											
Prather	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
167:											
Prather	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
168:											
Raught	Fair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
169:											
Raught	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
170:											
Raught	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
171:											
Reichel	Poor	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
172:											
Riverwash	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor
173:											
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Rubble land	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
174:											
Rose Valley	Fair	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
175:											
Rose Valley	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
176:											
Salkum	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
177:											
Salkum	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
178:											
Salkum	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
179:											
Sara	Fair	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
180:											
Sara	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
181:											
Sara	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
182:											
Sara	Fair	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
183:											
Sarazan	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
184:											
Sarazan	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
185:											
Sauvola	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
186:											
Sauvola	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
187:											
Sauvola	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
188:											
Schneider	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
189:											
Schneider	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
190:											
Schneider	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
191:											
Schneider	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
192:											
Seaquest	Good	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
193:											
Seaquest	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
194:											
Seaquest	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
195:											
Semiahmoo	Very poor.	Poor	Poor	---	---	Poor	Good	Good	Poor	---	Good
196:											
Siouxon	Poor	Poor	Good	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
197:											
Siouxon	Very poor.	Poor	Good	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
198:											
Siouxon	Very poor.	Very poor.	Good	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
199:											
Snohomish	Good	Good	Good	Good	Fair	Good	Good	Good	Good	Good	Good
200:											
Solo	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
201:											
Speelyai	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
202:											
Speelyai	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
203:											
Spodic Cryopsamments	Poor	Poor	Good	Good	Fair	Good	Poor	Very poor.	Fair	Good	Very poor.
204:											
Stahl	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
205:											
Stahl	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Reichel	Poor	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
206:											
Stahl	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Reichel	Poor	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
207:											
Stahl	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
207:											
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
208:											
Stella	Fair	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
209:											
Stella	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
210:											
Stella	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
211:											
Studebaker	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
212:											
Swem	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
213:											
Swem	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
214:											
Swift	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
215:											
Swift	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
216:											
Swift	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
217:											
Swift	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
218:											
Swift	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
219:											
Swift	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
220:											
Swift	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
220:											
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
221:											
Swift	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
222:											
Vader	Fair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
223:											
Vader	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
224:											
Vanson	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.
225:											
Vanson	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.
226:											
Vanson	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
227:											
Vanson	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
228:											
Vanson	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
229:											
Vanson	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.
230:											
Vanson	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.
231:											
Vanson	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
232:											
Vanson	Poor	Poor	Good	Good	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.
233:											
Vanson	Poor	Poor	Good	Good	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
234:											
Vanson	Poor	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
235:											
Vanson	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
236:											
Vanson	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hatchet	Fair	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
237:											
Vanson	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hatchet	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
238:											
Vanson	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Hatchet	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
239:											
Vanson	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hatchet	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.
240:											
Vanson	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hatchet	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.
241:											
Vanson	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Hatchet	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
242:											
Vanson	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
243:											
Vanson	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
244:											
Vanson	Poor	Poor	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
245:											
Vanson	Very poor.	Very poor.	Good	Fair	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
246:											
Voight	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
247:											
Winston	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
248:											
Wyant	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
249:											
Wyant	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
250:											
Xana	Very poor.	Very poor.	Fair	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
251:											
Xana	Very poor.	Very poor.	Fair	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
252:											
Xeno	Very poor.	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
253:											
Xeno	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
254:											
Xerorthents	Very poor.	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
255:											
Yalelake	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
256:											
Yalelake	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
257:											
Yalelake	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
258:											
Zenker	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
259:											
Zenker	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
260:											
Zymer	Poor	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
261:											
Zymer	Very poor.	Very poor.	Good	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
262:											
Zynbar	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
263:											
Water	---	---	---	---	---	---	---	---	---	---	---

Table 12.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1:						
Andaquepts	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.
2:						
Andic Cryaquepts	Severe: wetness, cutbanks cave, depth to rock.	Severe: slope, wetness.	Severe: slope, wetness, depth to rock.	Severe: slope, wetness.	Severe: slope, wetness.	Severe: slope, wetness.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
3:						
Andic Cryumbrepts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
4:						
Andic Cryumbrepts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
5:						
Arents	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: frost action, wetness.	Severe: small stones, droughty.
6:						
Astoria	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
7:						
Baumgard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
8:						
Baumgard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
9:						
Beigle	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
10:						
Beigle	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
11:						
Boistfort	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
12:						
Buckpeak	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
13:						
Buckpeak	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
14:						
Bunker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
15:						
Bunker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
16:						
Camas	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: large stones.
17:						
Caples	Severe: wetness.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell, wetness.	Severe: flooding, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
18:						
Carrolls	Severe: ponding, cutbanks cave.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.
19:						
Carrolls	Severe: ponding, cutbanks cave.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
20:						
Carrolls	Severe: ponding, cutbanks cave.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
21: Centralia	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
22: Centralia	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
23: Centralia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
24: Cinebar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
25: Cinebar	Slight	Slight	Slight	Slight	Severe: frost action, low strength.	Slight.
26: Cinebar	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
27: Cinebar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
28: Cinebar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
29: Cinnamon	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
30: Cinnamon	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
31: Cinnamon	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
32: Clato	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: frost action.	Slight.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
33: Coweeman	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, slope, wetness.	Severe: low strength, shrink-swell.	Moderate: slope, wetness.
34: Coweeman	Severe: slope, wetness.	Severe: shrink-swell, slope, wetness.	Severe: shrink-swell, slope, wetness.	Severe: shrink-swell, slope, wetness.	Severe: low strength, shrink-swell, slope.	Severe: slope.
35: Cowlitz	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: small stones, droughty.
36: Cowlitz	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: small stones, droughty.
37: Cowlitz	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: small stones, droughty.
38: Cowlitz	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones, droughty.
39: Delameter	Severe: cutbanks cave.	Moderate: large stones, slope.	Moderate: large stones, slope.	Severe: slope.	Moderate: large stones, slope.	Severe: large stones, small stones, droughty.
40: Dobbs	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
41: Dobbs	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
42: Domell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
43: Domell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
44: Domell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
45:						
Domell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
46:						
Domell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
47:						
Edgewick	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, droughty.
48:						
Elkprairie	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
49:						
Elochoman	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
50:						
Ferteg	Moderate: too clayey, wetness.	Slight	Moderate: shrink-swell, wetness.	Moderate: slope.	Severe: frost action, low strength.	Slight.
51:						
Ferteg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
52:						
Forsyth	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
53:						
Forsyth	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
54:						
Germany	Severe: excess humus.	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
55:						
Germany	Severe: excess humus.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
56:						
Germany	Severe: excess humus, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
57:						
Germany	Severe: excess humus, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
58:						
Germany	Severe: excess humus.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
59:						
Germany	Severe: excess humus, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
60:						
Germany	Severe: excess humus, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
61:						
Gobar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
62:						
Gobar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
63:						
Gobar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
64:						
Gobar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
65:						
Godfrey	Severe: wetness.	Severe: flooding, shrink-swell, wetness.	Severe: flooding, shrink-swell, wetness.	Severe: flooding, shrink-swell, wetness.	Severe: low strength, shrink-swell, wetness.	Severe: wetness.
66:						
Greenwater	Severe: slope, cutbanks cave.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: slope.	Severe: slope.
67:						
Greenwater	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
68:						
Greenwater	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: small stones, droughty.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
69:						
Greenwater	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: droughty.
70:						
Hatchet	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: frost action, large stones, slope.	Severe: slope, droughty.
71:						
Hatchet	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: frost action, large stones, slope.	Severe: slope, droughty.
72:						
Hatchet	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: frost action, large stones, slope.	Severe: large stones, slope, small stones.
73:						
Hatchet	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: frost action, large stones, slope.	Severe: large stones, slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
74:						
Hatchet	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: frost action, large stones, slope.	Severe: large stones, slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
75:						
Hatchet	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: frost action, large stones, slope.	Severe: slope, droughty.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
76:						
Hazeldell	Moderate: slope, too clayey.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: shrink-swell, slope.	Moderate: slope, small stones.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
77:						
Hazeldell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
78:						
Hazeldell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
79:						
Hazeldell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
80:						
Hazeldell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
81:						
Histic Cryaquepts	Severe: excess humus, wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: excess humus, wetness.
82:						
Histic Humaquepts	Severe: ponding, cutbanks cave.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, frost action, ponding.	Severe: excess humus, flooding, ponding.
83:						
Hoffstadt	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope, droughty.
84:						
Hoffstadt	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope, droughty.
85:						
Hoffstadt	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: frost action, large stones, slope.	Severe: slope, small stones, droughty.
86:						
Hoffstadt	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: frost action, large stones, slope.	Severe: slope, small stones, droughty.
87:						
Hoffstadt	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: frost action, large stones, slope.	Severe: slope, small stones, droughty.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
88:						
Hoffstadt	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: frost action, large stones, slope.	Severe: slope, small stones, droughty.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
89:						
Hoffstadt	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope, droughty.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
90:						
Hoffstadt	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope, droughty.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
91:						
Jonas	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
92:						
Jonas	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
93:						
Kalama	Moderate: slope, wetness.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope, wetness.	Severe: slope.	Moderate: frost action, shrink-swell, slope.	Moderate: slope, small stones.
94:						
Kalama	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
95:						
Kalama	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
96:						
Katula	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
97:						
Katula	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.
98:						
Katula	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.
Bunker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
99:						
Katula	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.
Bunker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
100:						
Kelso	Severe: wetness.	Moderate: shrink-swell, wetness.	Severe: wetness.	Moderate: shrink-swell, slope, wetness.	Moderate: low strength, shrink-swell, wetness.	Slight.
101:						
Kelso	Severe: wetness.	Moderate: shrink-swell, slope, wetness.	Severe: wetness.	Severe: slope.	Moderate: low strength, shrink-swell, wetness.	Moderate: slope.
102:						
Kelso	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Severe: slope.
103:						
Kelso	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Severe: slope.
104:						
Kosmos	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
105:						
Lacamas	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: low strength, shrink-swell, wetness.	Severe: wetness.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
106:						
Lates	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
107:						
Lates	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
108:						
Lates	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
109:						
Lithic Haplumbrepts	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
110:						
Lithic Umbric Vitrandepts	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
111:						
Lonestar	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
112:						
Lonestar	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
113:						
Lonestar	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
114:						
Lonestar	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
115:						
Lonestar	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
116:						
Lonestar	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
117:						
Lonestar	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
118:						
Lonestar	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
119:						
Loper	Severe: excess humus, slope.	Severe: low strength, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.	Severe: slope.
120:						
Loper	Severe: excess humus, slope.	Severe: low strength, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.	Severe: slope.
121:						
Lytell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
122:						
Lytell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
123:						
Mart	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: frost action, low strength.	Slight.
124:						
Mart	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
125:						
Mart	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
126:						
Mart	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
127:						
Maytown	Moderate: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, low strength.	Moderate: flooding.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
128:						
Melbourne	Moderate: slope, too clayey.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
129:						
Melbourne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
130:						
Minniece	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: low strength, shrink-swell, wetness.	Severe: wetness.
131:						
Mountsolo	Severe: cemented pan, wetness, cutbanks cave.	Severe: flooding, wetness.	Severe: flooding, cemented pan, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: cemented pan, wetness.
132:						
Mulholland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
133:						
Murnen	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
134:						
Natal	Severe: ponding.	Severe: shrink-swell, ponding.	Severe: shrink-swell, ponding.	Severe: shrink-swell, ponding.	Severe: low strength, shrink-swell, ponding.	Severe: ponding.
135:						
Newaukum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
136:						
Newaukum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
137:						
Newaukum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
138:						
Newaukum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
139:						
Newaukum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
140:						
Newaukum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
141:						
Newberg	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
142:						
Olequa	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: frost action, low strength.	Slight.
143:						
Olequa	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
144:						
Olequa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
145:						
Olequa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
146:						
Olympic	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
147:						
Olympic	Moderate: slope, too clayey.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
148:						
Olympic	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
149:						
Olympic	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
150:						
Olympic	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
151:						
Panamaker	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: small stones, too sandy, droughty.
152:						
Panamaker	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, small stones, droughty.
153:						
Pheeney	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
154:						
Pheeney	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
155:						
Pheeney	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
156:						
Pheeney	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Beigle	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
157:						
Pheeney	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Beigle	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
158:						
Pheeney	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
159:						
Pheeney	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
160:						
Pilchuck	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: droughty.
161:						
Pits	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: small stones, droughty.
162:						
Polepatch	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
163:						
Polepatch	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, small stones, droughty.
164:						
Polepatch	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, small stones, droughty.
165:						
Polepatch	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones, droughty.
166:						
Prather	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength.	Moderate: wetness.
167:						
Prather	Severe: wetness.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: slope, wetness.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
168:						
Raught	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
169:						
Raught	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
170:						
Raught	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
171:						
Reichel	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
172:						
Riverwash	Severe: wetness, cutbanks cave.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness, droughty.
173:						
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
Rubble land	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, small stones, droughty.
174:						
Rose Valley	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
175:						
Rose Valley	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: frost action, low strength.	Moderate: slope, wetness.
176:						
Salkum	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: frost action, low strength.	Slight.
177:						
Salkum	Moderate: slope, too clayey.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: frost action, low strength, slope.	Moderate: slope.
178:						
Salkum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
179:						
Sara	Severe: wetness.	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.
180:						
Sara	Severe: wetness.	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: slope, wetness.	Severe: low strength.	Moderate: slope, wetness.
181:						
Sara	Severe: slope, wetness.	Severe: slope, wetness.	Severe: shrink-swell, slope, wetness.	Severe: slope, wetness.	Severe: low strength, slope.	Severe: slope.
182:						
Sara	Severe: wetness.	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.
183:						
Sarazan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope, small stones.
184:						
Sarazan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope, small stones.
185:						
Sauvola	Severe: wetness.	Moderate: shrink-swell, wetness.	Severe: wetness.	Moderate: shrink-swell, slope, wetness.	Severe: low strength.	Moderate: wetness.
186:						
Sauvola	Severe: wetness.	Moderate: shrink-swell, slope, wetness.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: slope, wetness.
187:						
Sauvola	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
188:						
Schneider	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
189:						
Schneider	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
190:						
Schneider	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
190:						
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
191:						
Schneider	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
192:						
Seaquest	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
193:						
Seaquest	Moderate: slope, too clayey.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
194:						
Seaquest	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
195:						
Semiahmoo	Severe: excess humus, ponding.	Severe: low strength, subsides, ponding.	Severe: subsides, ponding.	Severe: low strength, subsides, ponding.	Severe: subsides, ponding.	Severe: excess humus, ponding.
196:						
Siouxon	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: frost action, large stones, slope.	Severe: large stones, slope, small stones.
197:						
Siouxon	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: frost action, large stones, slope.	Severe: large stones, slope, small stones.
198:						
Siouxon	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: frost action, large stones, slope.	Severe: large stones, slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
199:						
Snohomish	Severe: excess humus, wetness.	Severe: flooding, wetness, subsides.	Severe: flooding, wetness, subsides.	Severe: flooding, wetness, subsides.	Severe: frost action, subsides.	Moderate: wetness.
200:						
Solo	Severe: wetness, cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Moderate: wetness.	Severe: droughty.
201:						
Speelyai	Severe: cemented pan, wetness.	Severe: wetness.	Severe: cemented pan, wetness.	Severe: wetness.	Severe: wetness.	Severe: cemented pan, wetness, droughty.
202:						
Speelyai	Severe: cemented pan, slope, wetness.	Severe: slope, wetness.	Severe: cemented pan, slope, wetness.	Severe: slope, wetness.	Severe: slope, wetness.	Severe: slope, wetness, droughty.
203:						
Spodic Cryopsamments	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
204:						
Stahl	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
205:						
Stahl	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Reichel	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
206:						
Stahl	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Reichel	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
207:						
Stahl	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
208:						
Stella	Severe: wetness.	Moderate: shrink-swell, wetness.	Severe: wetness.	Moderate: shrink-swell, slope, wetness.	Severe: frost action, low strength.	Slight.
209:						
Stella	Severe: wetness.	Moderate: shrink-swell, slope, wetness.	Severe: wetness.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
210:						
Stella	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
211:						
Studebaker	Severe: cutbanks cave.	Moderate: large stones, slope.	Moderate: large stones, slope.	Severe: slope.	Moderate: large stones, slope.	Severe: small stones, droughty.
212:						
Swem	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
213:						
Swem	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
214:						
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
215:						
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
216:						
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
217:						
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
218:						
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
219:						
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
220:						
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
221:						
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
222:						
Vader	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
223:						
Vader	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
224:						
Vanson	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
225:						
Vanson	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
226:						
Vanson	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
227:						
Vanson	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
228:						
Vanson	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
229:						
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
230:						
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
231:						
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
232:						
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
233:						
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
234:						
Vanson	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
235:						
Vanson	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
236:						
Vanson	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
Hatchet	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: frost action, large stones, slope.	Severe: slope, droughty.
237:						
Vanson	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
Hatchet	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: frost action, large stones, slope.	Severe: slope, droughty.
238:						
Vanson	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
Hatchet	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: frost action, large stones, slope.	Severe: slope, droughty.
239:						
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
239:						
Hatchet	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: frost action, slope.	Severe: large stones, slope, small stones.
240:						
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
Hatchet	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: frost action, slope.	Severe: large stones, slope, small stones.
241:						
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
Hatchet	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: frost action, slope.	Severe: large stones, slope, small stones.
242:						
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
243:						
Vanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
244:						
Vanson	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
245:						
Vanson	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
245:						
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
246:						
Voight	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
247:						
Winston	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
248:						
Wyant	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell, slope.	Severe: slope.
249:						
Wyant	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell, slope.	Severe: slope.
250:						
Xana	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
251:						
Xana	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
252:						
Xeno	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
253:						
Xeno	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
254:						
Xerorthents	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
255:						
Yalelake	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
256:						
Yalelake	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.

Table 12.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
257:						
Yalelake	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope.	Severe: slope.
258:						
Zenker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
259:						
Zenker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
260:						
Zymer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
261:						
Zymer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, droughty.
262:						
Zynbar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
263:						
Water	---	---	---	---	---	---

Table 13.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1:					
Andaquepts	Severe: percs slowly, wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: small stones, wetness.
2:					
Andic Cryaquepts	Severe: wetness, poor filter, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, wetness, depth to rock.	Severe: seepage, wetness, depth to rock.	Poor: slope, small stones, depth to rock.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
3:					
Andic Cryumbrepts	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: large stones, slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
4:					
Andic Cryumbrepts	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: large stones, slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
5:					
Arents	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: small stones.
6:					
Astoria	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: hard to pack, slope, too clayey.
7:					
Baumgard	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
8:					
Baumgard	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
9:					
Beigle	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope.
10:					
Beigle	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope.
11:					
Boistfort	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: hard to pack, slope, too clayey.
12:					
Buckpeak	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
13:					
Buckpeak	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
14:					
Bunker	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope.
15:					
Bunker	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope.
16:					
Camas	Severe: flooding, poor filter.	Severe: flooding, large stones, seepage.	Severe: flooding, large stones, seepage.	Severe: flooding, seepage.	Poor: small stones.
17:					
Caples	Severe: percs slowly, wetness.	Slight	Severe: too clayey, wetness.	Severe: wetness.	Poor: hard to pack, too clayey.
18:					
Carrolls	Severe: flooding, ponding, poor filter.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: seepage, too sandy, ponding.
19:					
Carrolls	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, too sandy, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
20:					
Carrolls	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, too sandy, ponding.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
21:					
Centralia	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
22:					
Centralia	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: slope, too clayey.
23:					
Centralia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
24:					
Cinebar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
25:					
Cinebar	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Poor: hard to pack.
26:					
Cinebar	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: hard to pack.
27:					
Cinebar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
28:					
Cinebar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
29:					
Cinnamon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
30:					
Cinnamon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
31:					
Cinnamon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
32:					
Clato	Moderate: flooding, percs slowly.	Moderate: seepage.	Moderate: flooding.	Moderate: flooding.	Good.
33:					
Coweeman	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
34:					
Coweeman	Severe: percs slowly, slope, wetness.	Severe: slope.	Severe: slope, too clayey, wetness.	Severe: slope, wetness.	Poor: hard to pack, slope, too clayey.
35:					
Cowlitz	Severe: flooding, poor filter.	Severe: flooding, seepage.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, small stones, too sandy.
36:					
Cowlitz	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, small stones, too sandy.
37:					
Cowlitz	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, small stones, too sandy.
38:					
Cowlitz	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, small stones, too sandy.
39:					
Delameter	Severe: poor filter.	Severe: large stones, seepage, slope.	Severe: large stones, seepage, too sandy.	Severe: seepage.	Poor: seepage, small stones, too sandy.
40:					
Dobbs	Severe: cemented pan, slope, wetness.	Severe: cemented pan, slope.	Severe: slope.	Severe: cemented pan, slope.	Poor: cemented pan, slope.
41:					
Dobbs	Severe: cemented pan, slope, wetness.	Severe: cemented pan, slope.	Severe: slope.	Severe: cemented pan, slope.	Poor: cemented pan, slope.
42:					
Domell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
43:					
Domell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
44:					
Domell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
45:					
Domell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
46:					
Domell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
47:					
Edgewick	Severe: flooding, poor filter.	Severe: flooding, seepage.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, small stones, too sandy.
48:					
Elkprairie	Severe: slope.	Severe: seepage, slope.	Severe: slope, too acid	Severe: seepage, slope.	Poor: hard to pack, slope.
49:					
Elochoman	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
50:					
Ferteg	Severe: percs slowly, wetness.	Moderate: excess humus, seepage, slope.	Severe: too clayey.	Moderate: wetness.	Poor: hard to pack, too clayey.
51:					
Ferteg	Severe: percs slowly, slope, wetness.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: hard to pack, slope, too clayey.
52:					
Forsyth	Severe: slope, poor filter.	Severe: large stones, seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, small stones, too sandy.
53:					
Forsyth	Severe: slope, poor filter.	Severe: large stones, seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, small stones, too sandy.
54:					
Germany	Moderate: percs slowly.	Moderate: excess humus, seepage, slope.	Moderate: too clayey.	Slight	Poor: hard to pack.
55:					
Germany	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Poor: hard to pack.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
56:					
Germany	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
57:					
Germany	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
58:					
Germany	Moderate: percs slowly, slope, depth to rock.	Severe: slope.	Severe: depth to rock.	Moderate: slope, depth to rock.	Poor: hard to pack.
59:					
Germany	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope.
60:					
Germany	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope.
61:					
Gobar	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
62:					
Gobar	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
63:					
Gobar	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
64:					
Gobar	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
65:					
Godfrey	Severe: flooding, percs slowly, wetness.	Severe: flooding.	Severe: flooding, too clayey, wetness.	Severe: flooding, wetness.	Poor: hard to pack, too clayey, wetness.
66:					
Greenwater	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, slope, too sandy.
67:					
Greenwater	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
68:					
Greenwater	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
69:					
Greenwater	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
70:					
Hatchet	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: seepage, slope, small stones.
71:					
Hatchet	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: seepage, slope, small stones.
72:					
Hatchet	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: seepage, small stones, depth to rock.
73:					
Hatchet	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: seepage, small stones, depth to rock.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
74:					
Hatchet	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: seepage, small stones, depth to rock.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
75:					
Hatchet	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: seepage, slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
76:					
Hazeldell	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: small stones, too clayey.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
77:					
Hazeldell	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope, small stones, too clayey.
78:					
Hazeldell	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope, small stones, too clayey.
79:					
Hazeldell	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
80:					
Hazeldell	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
81:					
Histic Cryaquepts	Severe: wetness, poor filter.	Severe: excess humus, seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, small stones, too sandy.
82:					
Histic Humaquepts	Severe: flooding, ponding, depth to rock.	Severe: flooding, seepage, depth to rock.	Severe: flooding, seepage, depth to rock.	Severe: flooding, seepage, depth to rock.	Poor: seepage, too sandy, depth to rock.
83:					
Hoffstadt	Severe: slope.	Severe: slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: seepage, slope, small stones.
84:					
Hoffstadt	Severe: slope.	Severe: slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: seepage, slope, small stones.
85:					
Hoffstadt	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: large stones, seepage, slope.
86:					
Hoffstadt	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: large stones, seepage, slope.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
87:					
Hoffstadt	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: large stones, seepage, slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
88:					
Hoffstadt	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: large stones, seepage, slope.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
89:					
Hoffstadt	Severe: slope.	Severe: slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: seepage, slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
90:					
Hoffstadt	Severe: slope.	Severe: slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: seepage, slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
91:					
Jonas	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, large stones, slope.
92:					
Jonas	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, large stones, slope.
93:					
Kalama	Severe: percs slowly, wetness.	Severe: slope, wetness.	Moderate: slope, too clayey, wetness.	Moderate: slope, wetness.	Poor: small stones.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
94:					
Kalama	Severe: percs slowly, slope, wetness.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
95:					
Kalama	Severe: percs slowly, slope, wetness.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
96:					
Katula	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: large stones, slope, depth to rock.
97:					
Katula	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: large stones, slope, depth to rock.
98:					
Katula	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: large stones, slope, depth to rock.
Bunker	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope.
99:					
Katula	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: large stones, slope, depth to rock.
Bunker	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope.
100:					
Kelso	Severe: percs slowly, wetness.	Moderate: seepage, slope.	Moderate: too clayey, wetness.	Moderate: wetness.	Fair: too clayey, wetness.
101:					
Kelso	Severe: percs slowly, wetness.	Severe: slope.	Moderate: slope, too clayey, wetness.	Moderate: slope. wetness.	Fair: slope, too clayey, wetness.
102:					
Kelso	Severe: percs slowly, slope, wetness.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
103:					
Kelso	Severe: percs slowly, slope, wetness.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
104:					
Kosmos	Severe: percs slowly, wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
105:					
Lacamas	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey, wetness.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.
106:					
Lates	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
107:					
Lates	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
108:					
Lates	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
109:					
Lithic Haplumbrepts	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
110:					
Lithic Umbric Vitrandepts	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock.	Poor: small stones, depth to rock.
111:					
Lonestar	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
112:					
Lonestar	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
113:					
Lonestar	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
114:					
Lonestar	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
115:					
Lonestar	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
116:					
Lonestar	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
117:					
Lonestar	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
118:					
Lonestar	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: slope, thin layer.
119:					
Loper	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: hard to pack, slope, too clayey.
120:					
Loper	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: hard to pack, slope, too clayey.
121:					
Lytell	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope.
122:					
Lytell	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope.
123:					
Mart	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
124:					
Mart	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: slope, too clayey.
125:					
Mart	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
126:					
Mart	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
127:					
Maytown	Severe: flooding, percs slowly, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
128:					
Melbourne	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: hard to pack, too clayey.
129:					
Melbourne	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: hard to pack, slope, too clayey.
130:					
Minniece	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.
131:					
Mountsolo	Severe: flooding, cemented pan, wetness.	Severe: flooding, cemented pan.	Severe: flooding, too sandy, wetness.	Severe: flooding, cemented pan, wetness.	Poor: cemented pan, seepage, too sandy.
132:					
Mulholland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
133:					
Murnen	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
134:					
Natal	Severe: percs slowly, ponding.	Severe: ponding.	Severe: too clayey, ponding.	Severe: ponding.	Poor: hard to pack, too clayey, ponding.
135:					
Newaukum	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope, small stones.
136:					
Newaukum	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope, small stones.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
137:					
Newaukum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope, small stones.
138:					
Newaukum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope, small stones.
139:					
Newaukum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope, small stones.
140:					
Newaukum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
141:					
Newberg	Severe: flooding, poor filter.	Severe: flooding, seepage.	Severe: flooding, seepage.	Severe: flooding, seepage.	Fair: too sandy.
142:					
Olequa	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
143:					
Olequa	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: slope, too clayey.
144:					
Olequa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
145:					
Olequa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
146:					
Olympic	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: hard to pack, too clayey.
147:					
Olympic	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: hard to pack, too clayey.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
148:					
Olympic	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: hard to pack, slope, too clayey.
149:					
Olympic	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: hard to pack, slope, too clayey.
150:					
Olympic	Severe: slope.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: hard to pack, slope, too clayey.
151:					
Panamaker	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
152:					
Panamaker	Severe: flooding.	Severe: flooding.	Severe: flooding, too sandy.	Severe: flooding.	Poor: too sandy.
153:					
Pheeney	Severe: percs slowly, poor filter, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, small stones, depth to rock.
154:					
Pheeney	Severe: percs slowly, poor filter, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, small stones, depth to rock.
155:					
Pheeney	Severe: percs slowly, poor filter, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, small stones, depth to rock.
156:					
Pheeney	Severe: percs slowly, poor filter, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, small stones, depth to rock.
Beigle	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope.
157:					
Pheeney	Severe: percs slowly, poor filter, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, small stones, depth to rock.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
157:					
Beigle	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope.
158:					
Pheeney	Severe: percs slowly, poor filter, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, small stones, depth to rock.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
159:					
Pheeney	Severe: percs slowly, poor filter, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, small stones, depth to rock.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
160:					
Pilchuck	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
161:					
Pits	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, small stones, too sandy.
162:					
Polepatch	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, small stones, too sandy.
163:					
Polepatch	Severe: slope, poor filter.	Severe: large stones, seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, small stones, too sandy.
164:					
Polepatch	Severe: slope, poor filter.	Severe: large stones, seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, small stones, too sandy.
165:					
Polepatch	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, small stones, too sandy.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
166:					
Prather	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey, wetness.	Moderate: wetness.	Poor: hard to pack, too clayey.
167:					
Prather	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: too clayey, wetness.	Moderate: slope, wetness.	Poor: hard to pack, too clayey.
168:					
Raught	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
169:					
Raught	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
170:					
Raught	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
171:					
Reichel	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope.
172:					
Riverwash	Severe: flooding, wetness, poor filter.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, small stones, too sandy.
173:					
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Rubble land	Severe: large stones, slope, poor filter.	Severe: large stones, seepage, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: seepage, slope, small stones.
174:					
Rose Valley	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
175:					
Rose Valley	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
176:					
Salkum	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: hard to pack, too clayey.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
177:					
Salkum	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: hard to pack, slope, too clayey.
178:					
Salkum	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
179:					
Sara	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey, wetness.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.
180:					
Sara	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: too clayey, wetness.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.
181:					
Sara	Severe: percs slowly, slope, wetness.	Severe: slope, wetness.	Severe: slope, too clayey, wetness.	Severe: slope, wetness.	Poor: hard to pack, slope, too clayey.
182:					
Sara	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey, wetness.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.
183:					
Sarazan	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
184:					
Sarazan	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
185:					
Sauvola	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey, wetness.	Moderate: wetness.	Poor: hard to pack, too clayey.
186:					
Sauvola	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: too clayey, wetness.	Moderate: slope, wetness.	Poor: hard to pack, too clayey.
187:					
Sauvola	Severe: percs slowly, slope, wetness.	Severe: slope, wetness.	Severe: slope, too clayey, wetness.	Severe: slope.	Poor: hard to pack, slope, too clayey.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
188:					
Schneider	Severe: slope.	Severe: slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
189:					
Schneider	Severe: slope.	Severe: slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
190:					
Schneider	Severe: slope.	Severe: slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
191:					
Schneider	Severe: slope.	Severe: slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
192:					
Seaquest	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
193:					
Seaquest	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
194:					
Seaquest	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope, too clayey.
195:					
Semiahmoo	Severe: percs slowly, subsides, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: ponding.	Poor: excess humus, ponding.
196:					
Siouxon	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
197:					
Siouxon	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: slope, small stones.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
198:					
Siouxon	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
199:					
Snohomish	Severe: wetness.	Severe: excess humus, wetness.	Severe: excess humus, wetness.	Severe: wetness.	Poor: excess humus, wetness.
200:					
Solo	Severe: cemented pan, wetness, poor filter.	Severe: cemented pan, seepage.	Severe: seepage, wetness.	Severe: cemented pan, seepage.	Poor: cemented pan, seepage, small stones.
201:					
Speelyai	Severe: cemented pan, wetness.	Severe: cemented pan,	Severe: seepage, wetness.	Severe: cemented pan, wetness.	Poor: cemented pan, seepage, small stones.
202:					
Speelyai	Severe: cemented pan, slope, wetness.	Severe: cemented pan, slope.	Severe: seepage, slope, wetness.	Severe: cemented pan, slope, wetness.	Poor: cemented pan, seepage, small stones.
203:					
Spodic Cryopsamments	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: seepage, slope, too sandy.
204:					
Stahl	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
205:					
Stahl	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Reichel	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope.
206:					
Stahl	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
206:					
Reichel	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, slope.
207:					
Stahl	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
208:					
Stella	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: too clayey, wetness.	Moderate: wetness.	Fair: thin layer, too clayey, wetness.
209:					
Stella	Severe: percs slowly, wetness.	Severe: slope, wetness.	Moderate: slope, too clayey, wetness.	Moderate: slope, wetness.	Fair: slope, too clayey, wetness.
210:					
Stella	Severe: percs slowly, slope, wetness.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Poor: slope.
211:					
Studebaker	Moderate: large stones, slope.	Severe: large stones, seepage, slope.	Severe: large stones, seepage, too sandy.	Severe: seepage.	Poor: seepage, small stones, too sandy.
212:					
Swem	Severe: percs slowly, slope, wetness.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
213:					
Swem	Severe: percs slowly, slope, wetness.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
214:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
215:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
216:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
217:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
218:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
219:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope. depth to rock.	Poor: slope, depth to rock.
220:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
221:					
Swift	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
222:					
Vader	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
223:					
Vader	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
224:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: slope, small stones.
225:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: slope, small stones.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
226:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: slope, small stones.
227:					
Vanson	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
228:					
Vanson	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
229:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
230:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
231:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
232:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
233:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
234:					
Vanson	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
235:					
Vanson	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
236:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: slope, small stones.
Hatchet	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: seepage, slope, small stones.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
237:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: slope, small stones.
Hatchet	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: seepage, slope, small stones.
238:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: slope, small stones.
Hatchet	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.	Severe: slope.	Poor: seepage, slope, small stones.
239:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
Hatchet	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: seepage, small stones, depth to rock.
240:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
Hatchet	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: seepage, small stones, depth to rock.
241:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
Hatchet	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, depth to rock.	Poor: seepage, small stones, depth to rock.
242:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
243:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
244:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
245:					
Vanson	Severe: slope.	Severe: seepage, slope.	Severe: slope, depth to rock.	Severe: seepage, slope.	Poor: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
246:					
Voight	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
247:					
Winston	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too sandy.	Slight	Poor: hard to pack, small stones, too sandy.
248:					
Wyant	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, depth to rock.	Poor: hard to pack, too clayey, depth to rock.
249:					
Wyant	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, depth to rock.	Poor: hard to pack, too clayey, depth to rock.
250:					
Xana	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, slope, small stones.
251:					
Xana	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, slope, small stones.

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
252:					
Xeno	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
253:					
Xeno	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
254:					
Xerorthents	Severe: slope, poor filter, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, small stones, depth to rock.
255:					
Yalelake	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
256:					
Yalelake	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
257:					
Yalelake	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
258:					
Zenker	Severe: percs slowly, slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: hard to pack, slope.
259:					
Zenker	Severe: percs slowly, slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: hard to pack, slope.
260:					
Zymer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
261:					
Zymer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
262:					
Zynbar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
263:					
Water	---	---	---	---	---

Table 14.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
1:				
Andaquepts	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, wetness.
2:				
Andic Cryaquepts	Poor: slope, wetness, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, wetness.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
3:				
Andic Cryumbrepts	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
4:				
Andic Cryumbrepts	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
5:				
Arents	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
6:				
Astoria	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
7:				
Baumgard	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
8:				
Baumgard	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
9:				
Beigle	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
10:				
Beigle	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
11:				
Boistfort	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
12:				
Buckpeak	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
13:				
Buckpeak	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
14:				
Bunker	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
15:				
Bunker	Poor: slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
16:				
Camas	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
17:				
Caples	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
18:				
Carrolls	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
19:				
Carrolls	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
20:				
Carrolls	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
21:				
Centralia	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
22:				
Centralia	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
23:				
Centralia	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
24:				
Cinebar	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
25:				
Cinebar	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
26:				
Cinebar	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones.
27:				
Cinebar	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
28:				
Cinebar	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
29:				
Cinnamon	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
30:				
Cinnamon	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
31:				
Cinnamon	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
32:				
Clato	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
33:				
Coweeman	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
34:				
Coweeman	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
35:				
Cowlitz	Good	Probable	Probable	Poor: area reclaim, small stones, too sandy.
36:				
Cowlitz	Good	Probable	Probable	Poor: area reclaim, small stones, too sandy.
37:				
Cowlitz	Good	Probable	Probable	Poor: area reclaim, small stones, too sandy.
38:				
Cowlitz	Fair: slope.	Probable	Probable	Poor: area reclaim, small stones, too sandy.
39:				
Delameter	Fair: large stones.	Probable	Probable	Poor: area reclaim, small stones, too sandy.
40:				
Dobbs	Fair: slope, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones,
41:				
Dobbs	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
42:				
Domell	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
43:				
Domell	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
44:				
Domell	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
45:				
Domell	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
46:				
Domell	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
47:				
Edgewick	Good	Probable	Probable	Poor: area reclaim, small stones.
48:				
Elkprairie	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, too acid.
49:				
Elochoman	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
50:				
Ferteg	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
51:				
Ferteg	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
52:				
Forsyth	Fair: large stones, slope.	Probable	Probable	Poor: area reclaim, small stones, too sandy.
53:				
Forsyth	Poor: slope.	Probable	Probable	Poor: area reclaim, small stones, too sandy.
54:				
Germany	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
55:				
Germany	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
56:				
Germany	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
57:				
Germany	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
58:				
Germany	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
59:				
Germany	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
60:				
Germany	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
61:				
Gobar	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
62:				
Gobar	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
63:				
Gobar	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
64:				
Gobar	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
65:				
Godfrey	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
66:				
Greenwater	Poor: slope.	Probable	Improbable: too sandy.	Poor: slope, too sandy.
67:				
Greenwater	Good	Probable	Improbable: too sandy.	Poor: too sandy.
68:				
Greenwater	Good	Probable	Improbable: too sandy.	Poor: small stones, too sandy.
69:				
Greenwater	Good	Probable	Improbable: too sandy.	Poor: too sandy.
70:				
Hatchet	Poor: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: slope, small stones.
71:				
Hatchet	Poor: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: slope, small stones.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
72:				
Hatchet	Poor: large stones, slope, depth to rock.	Improbable: large stones.	Improbable: large stones.	Poor: slope, small stones.
73:				
Hatchet	Poor: large stones, slope, depth to rock.	Improbable: large stones.	Improbable: large stones.	Poor: slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
74:				
Hatchet	Poor: large stones, slope, depth to rock.	Improbable: large stones.	Improbable: large stones.	Poor: slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
75:				
Hatchet	Poor: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
76:				
Hazeldell	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
77:				
Hazeldell	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
78:				
Hazeldell	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
79:				
Hazeldell	Fair: shrink-swell, thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
80:				
Hazeldell	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
81:				
Histic Cryaquepts	Poor: wetness.	Probable	Improbable: too sandy.	Poor: area reclaim, excess humus, wetness.
82:				
Histic Humaquepts	Poor: wetness, depth to rock.	Probable	Probable	Poor: area reclaim, small stones, too sandy.
83:				
Hoffstadt	Fair: large stones, thin layer, depth to rock.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, slope, small stones.
84:				
Hoffstadt	Poor: slope.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, slope, small stones.
85:				
Hoffstadt	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, slope, small stones.
86:				
Hoffstadt	Poor: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, slope, small stones.
87:				
Hoffstadt	Poor: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
88:				
Hoffstadt	Poor: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
89:				
Hoffstadt	Poor: slope.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, slope, small stones.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
89:				
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
90:				
Hoffstadt	Poor: slope.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
91:				
Jonas	Fair: large stones, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
92:				
Jonas	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
93:				
Kalama	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
94:				
Kalama	Fair: shrink-swell, slope, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
95:				
Kalama	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
96:				
Katula	Poor: large stones, slope, depth to rock.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: slope, small stones.
97:				
Katula	Poor: large stones, slope, depth to rock.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: slope, small stones.
98:				
Katula	Poor: large stones, slope, depth to rock.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: slope, small stones.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
98:				
Bunker	Poor: slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
99:				
Katula	Poor: large stones, slope, depth to rock.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: slope, small stones.
Bunker	Poor: slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
100:				
Kelso	Fair: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
101:				
Kelso	Fair: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, too clayey.
102:				
Kelso	Fair: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
103:				
Kelso	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
104:				
Kosmos	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
105:				
Lacamas	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
106:				
Lates	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
107:				
Lates	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
108:				
Lates	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
108:				
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
109:				
Lithic Haplumbrepts	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, depth to rock.
110:				
Lithic Umbric Vitrandepts	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, depth to rock.
111:				
Lonestar	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
112:				
Lonestar	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
113:				
Lonestar	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
114:				
Lonestar	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
115:				
Lonestar	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
116:				
Lonestar	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
117:				
Lonestar	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
118:				
Lonestar	Fair: slope, thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
119:				
Loper	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
120:				
Loper	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
121:				
Lytell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
122:				
Lytell	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
123:				
Mart	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
124:				
Mart	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
125:				
Mart	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
126:				
Mart	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
127:				
Maytown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
128:				
Melbourne	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
129:				
Melbourne	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
130:				
Minniece	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
131:				
Mountsolo	Poor: wetness.	Probable	Probable	Poor: cemented pan, small stones, too sandy.
132:				
Mulholland	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
133:				
Murnen	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
134:				
Natal	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
135:				
Newaukum	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
136:				
Newaukum	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
137:				
Newaukum	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
138:				
Newaukum	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
139:				
Newaukum	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
140:				
Newaukum	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
141:				
Newberg	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
142:				
Olequa	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
143:				
Olequa	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
144:				
Olequa	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
145:				
Olequa	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
146:				
Olympic	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
147:				
Olympic	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
148:				
Olympic	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
149:				
Olympic	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
150:				
Olympic	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
151:				
Panamaker	Good	Probable	Probable	Poor: small stones, too sandy.
152:				
Panamaker	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
153:				
Pheeney	Poor: depth to rock.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: slope, small stones.
154:				
Pheeney	Poor: slope, depth to rock.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: slope, small stones.
155:				
Pheeney	Poor: slope, depth to rock.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: slope, small stones.
156:				
Pheeney	Poor: depth to rock.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: slope, small stones.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
156:				
Beigle	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
157:				
Pheeney	Poor: slope, depth to rock.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: slope, small stones.
Beigle	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
158:				
Pheeney	Poor: slope, depth to rock.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
159:				
Pheeney	Poor: slope, depth to rock.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
160:				
Pilchuck	Good	Probable	Probable	Poor: area reclaim, small stones, too sandy.
161:				
Pits	Good	Probable	Probable	Poor: area reclaim, small stones, too sandy.
162:				
Polepatch	Fair: slope.	Probable	Probable	Poor: area reclaim, small stones, too sandy.
163:				
Polepatch	Fair: large stones, slope.	Probable	Probable	Poor: area reclaim, small stones, too sandy.
164:				
Polepatch	Poor: slope.	Probable	Probable	Poor: area reclaim, small stones, too sandy.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
165:				
Polepatch	Fair: large stones, slope.	Probable	Probable	Poor: area reclaim, small stones, too sandy.
166:				
Prather	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
167:				
Prather	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
168:				
Raught	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
169:				
Raught	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
170:				
Raught	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
171:				
Reichel	Fair: low strength, shrink-swell, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
172:				
Riverwash	Poor: wetness.	Probable	Probable	Poor: area reclaim, small stones, too sandy.
173:				
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
Rubble land	Poor: large stones, slope.	Improbable: large stones, small stones.	Improbable: large stones.	Poor: area reclaim, slope, small stones.
174:				
Rose Valley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
175:				
Rose Valley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, too clayey.
176:				
Salkum	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
177:				
Salkum	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
178:				
Salkum	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
179:				
Sara	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, thin layer, too clayey.
180:				
Sara	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, thin layer, too clayey.
181:				
Sara	Poor: low strength, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
182:				
Sara	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, thin layer, too clayey.
183:				
Sarazan	Fair: slope, thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
184:				
Sarazan	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
185:				
Sauvola	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, thin layer.
186:				
Sauvola	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones, thin layer.
187:				
Sauvola	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
188:				
Schneider	Fair: large stones, thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
189:				
Schneider	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
190:				
Schneider	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
191:				
Schneider	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
192:				
Seaquest	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
193:				
Seaquest	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
194:				
Seaquest	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
195:				
Semiahmoo	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
196:				
Siouxon	Poor: large stones.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, slope, small stones.
197:				
Siouxon	Poor: large stones, slope.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, slope, small stones.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
198:				
Siouxon	Poor: large stones, slope.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
199:				
Snohomish	Fair: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus.
200:				
Solo	Fair: wetness.	Probable	Probable	Poor: area reclaim, small stones.
201:				
Speelyai	Poor: wetness.	Probable	Probable	Poor: area reclaim, cemented pan small stones.
202:				
Speelyai	Poor: slope, wetness.	Probable	Probable	Poor: area reclaim, cemented pan, small stones.
203:				
Spodic Cryopsamments	Fair: slope, depth to rock.	Probable	Improbable: too sandy.	Poor: slope, too sandy.
204:				
Stahl	Poor: slope, depth to rock.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: slope, small stones.
205:				
Stahl	Poor: depth to rock.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: slope, small stones.
Reichel	Fair: low strength, shrink-swell, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
206:				
Stahl	Poor: slope, depth to rock.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: slope, small stones.
Reichel	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
207:				
Stahl	Poor: slope, depth to rock.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
208:				
Stella	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
209:				
Stella	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, too clayey.
210:				
Stella	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
211:				
Studebaker	Fair: large stones.	Probable	Probable	Poor: area reclaim, small stones, too sandy.
212:				
Swem	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
213:				
Swem	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
214:				
Swift	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
215:				
Swift	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
216:				
Swift	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
217:				
Swift	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
218:				
Swift	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
219:				
Swift	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
220:				
Swift	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
221:				
Swift	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
222:				
Vader	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
223:				
Vader	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
224:				
Vanson	Fair: slope, thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
225:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
226:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
227:				
Vanson	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
228:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
229:				
Vanson	Fair: large stones, thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
230:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
231:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
232:				
Vanson	Fair: large stones, thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
233:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
234:				
Vanson	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
235:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
236:				
Vanson	Fair: slope, thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Hatchet	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: slope, small stones.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
237:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Hatchet	Poor: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: slope, small stones.
238:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Hatchet	Poor: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: slope, small stones.
239:				
Vanson	Fair: large stones, thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Hatchet	Poor: depth to rock.	Improbable: large stones.	Improbable: large stones.	Poor: slope, small stones.
240:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Hatchet	Poor: slope, depth to rock.	Improbable: large stones.	Improbable: large stones.	Poor: slope, small stones.
241:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Hatchet	Poor: slope, depth to rock.	Improbable: large stones.	Improbable: large stones.	Poor: slope, small stones.
242:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
243:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
244:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
245:				
Vanson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.
246:				
Voight	Fair: low strength, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
247:				
Winston	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
248:				
Wyant	Poor: low strength, shrink-swell, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
249:				
Wyant	Poor: low strength, shrink-swell, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
250:				
Xana	Fair: slope.	Probable	Improbable: too sandy.	Poor: area reclaim, slope, small stones.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
251:				
Xana	Poor: slope.	Probable	Improbable: too sandy.	Poor: area reclaim, slope, small stones.
252:				
Xeno	Fair: low strength, thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
253:				
Xeno	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
254:				
Xerorthents	Poor: slope, depth to rock.	Probable	Probable	Poor: area reclaim, slope, small stones.
255:				
Yalelake	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
256:				
Yalelake	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
257:				
Yalelake	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
258:				
Zenker	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
259:				
Zenker	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
260:				
Zymer	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
261:				
Zymer	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Rock outcrop	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, depth to rock.

Table 14.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
262:				
Zynbar------------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
263:				
Water-------------------	---	---	---	---

Table 15.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite
See text for definitions of terms used in this table. Absence of an entry indicates that no rating is appl

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting Drainage	Features affecting Irrigation	Features affecting Terrac diver
1:						
Andaquepts	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill.	Frost action, percs slowly.	Erodes easily, percs slowly, wetness.	Erodes wetnes
2:						
Andic Cryaquepts	Severe: seepage, slope.	Severe: seepage, wetness.	Severe: cutbanks cave, depth to rock.	Large stones, slope, depth to rock.	Slope, wetness, droughty.	Slope, wetnes depth
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth
3:						
Andic Cryumbrepts	Severe: slope.	Moderate: large stones, piping.	Severe: no water.	Deep to water	Large stones, slope.	Large s slope.
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth
4:						
Andic Cryumbrepts	Severe: slope.	Moderate: large stones, piping.	Severe: no water.	Deep to water	Fast intake, slope, soil blowing.	Large s slope, soil b
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth
5:						
Arents	Severe: seepage.	Moderate: large stones, seepage, piping.	Moderate: slow refill, deep to water.	Favorable	Wetness, droughty.	Large s wetnes

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terrac diver
6:						
Astoria----------------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Erodes slope.
7:						
Baumgard---------------	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope----------	Slope--
8:						
Baumgard---------------	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope----------	Slope--
9:						
Beigle-----------------	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope----------	Slope--
10:						
Beigle-----------------	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope----------	Slope--
11:						
Boistfort--------------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope--
12:						
Buckpeak---------------	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope----------	Slope--
13:						
Buckpeak---------------	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope----------	Slope--
14:						
Bunker-----------------	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope----------	Slope--
15:						
Bunker-----------------	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope----------	Slope--

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrace diver[s
16: Camas	Severe: seepage.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Flooding, large stones, droughty.	Large st too san
17: Caples	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly	Percs slowly, wetness.	Percs sl wetness
18: Carrolls	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Flooding, ponding, cutbanks cave.	Fast intake, ponding, droughty.	Erodes e too san ponding
19: Carrolls	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Fast intake, ponding, droughty.	Erodes e too san ponding
20: Carrolls	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Soil blowing, ponding, droughty.	Too sanc soil bl ponding
21: Centralia	Moderate: seepage, slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Favorabl
22: Centralia	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope
23: Centralia	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope
24: Cinebar	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Fast intake, slope, soil blowing.	Slope, soil bl

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrac... diver...
25: Cinebar	Moderate: seepage.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Favorable	Favorab...
26: Cinebar	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope--...
27: Cinebar	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope--...
28: Cinebar	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope--...
29: Cinnamon	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Slope, soil b...
30: Cinnamon	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Slope, soil b...
31: Cinnamon	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Slope, soil b...
32: Clato	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily.	Erodes ...
33: Coweeman	Severe: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, slope.	Percs slowly, slope, wetness.	Erodes ..., slope, wetnes...

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrac[es and] diver[sions]
34: Coweeman	Severe: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, slope.	Percs slowly, slope, wetness.	Percs sl[owly], slope, wetnes[s]
35: Cowlitz	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, soil blowing, droughty.	Large st[ones], too sa[ndy], soil bl[owing]
36: Cowlitz	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, droughty.	Large st[ones], too sa[ndy]
37: Cowlitz	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Large st[ones], slope, too sa[ndy]
38: Cowlitz	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Large st[ones], slope, too sa[ndy]
39: Delameter	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large st[ones], slope, too sa[ndy]
40: Dobbs	Severe: slope.	Severe: seepage.	Severe: no water.	Cemented pan, slope.	Cemented pan, slope, wetness.	Cemente[d pan], slope, wetnes[s]
41: Dobbs	Severe: slope.	Severe: seepage.	Severe: no water.	Cemented pan, slope.	Cemented pan, slope, wetness.	Cemente[d pan], slope, wetnes[s]
42: Domell	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Fast intake, slope, soil blowing.	Slope, soil bl[owing]

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting Drainage	Features affecting Irrigation	Features affecting Terrac diver
43:						
Domell	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil bl
44:						
Domell	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil bl
45:						
Domell	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil bl
46:						
Domell	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil bl
47:						
Edgewick	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Erodes easily, flooding, droughty.	Erodes e too sar
48:						
Elkprairie	Severe: seepage, slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Slope, soil bl
49:						
Elochoman	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Erodes e slope.
50:						
Ferteg	Moderate: seepage, slope.	Moderate: hard to pack, wetness.	Severe: no water.	Frost action, percs slowly, slope.	Percs slowly, slope, wetness.	Percs sl wetness

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting Drainage	Irrigation	Terrac diver
51:						
Ferteg----------------	Severe: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Frost action, percs slowly, slope.	Percs slowly, slope, wetness.	Percs s slope, wetnes
52:						
Forsyth---------------	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, too sa
53:						
Forsyth---------------	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, too sa
54:						
Germany---------------	Moderate: seepage, slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope----------	Favorab
55:						
Germany---------------	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope----------	Slope--
56:						
Germany---------------	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope----------	Slope--
57:						
Germany---------------	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope----------	Slope--
58:						
Germany---------------	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope----------	Slope--

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrac diver
59: Germany	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope--
60: Germany	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope--
61: Gobar	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope--
62: Gobar	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope--
63: Gobar	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope--
64: Gobar	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope--
65: Godfrey	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Flooding, percs slowly.	Flooding, percs slowly, wetness.	Percs s wetnes
66: Greenwater	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Slope, too sa soil b
67: Greenwater	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Too san soil b

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrace diver
68: Greenwater	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Too sand soil bl
69: Greenwater	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Too sand soil bl
70: Hatchet	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large st slope, soil bl
71: Hatchet	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large st slope, soil bl
72: Hatchet	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large st slope, depth t
73: Hatchet	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large st slope, depth t
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth t
74: Hatchet	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large st slope, depth t
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth t

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrace divers
75:						
Hatchet	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large st slope, soil bl
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth t
76:						
Hazeldell	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope
77:						
Hazeldell	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope
78:						
Hazeldell	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope
79:						
Hazeldell	Severe: slope.	Moderate: piping, thin layer.	Severe: no water.	Deep to water	Slope	Slope
80:						
Hazeldell	Severe: slope.	Moderate: piping, thin layer.	Severe: no water.	Deep to water	Slope	Slope
81:						
Histic Cryaquepts	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness	Too sand wetness
82:						
Histic Humaquepts	Severe: seepage.	Severe: seepage, ponding.	Severe: cutbanks cave, depth to rock.	Flooding, ponding, depth to rock.	Ponding, depth to rock, droughty.	Too sand ponding depth t
83:						
Hoffstadt	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large st slope, soil bl

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrac diver
84:						
Hoffstadt---------------	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, soil b
85:						
Hoffstadt---------------	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope.
86:						
Hoffstadt---------------	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope.
87:						
Hoffstadt---------------	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope.
Rock outcrop------------	Severe: slope, depth to rock.	Slight---------	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth
88:						
Hoffstadt---------------	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope.
Rock outcrop------------	Severe: slope, depth to rock.	Slight---------	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth
89:						
Hoffstadt---------------	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, soil b
Rock outcrop------------	Severe: slope, depth to rock.	Slight---------	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting Drainage	Features affecting Irrigation	Features affecting Terrac diver
90:						
Hoffstadt--------------	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, soil b
Rock outcrop-----------	Severe: slope, depth to rock.	Slight--------	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth
91:						
Jonas------------------	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Large stones, slope.	Large s slope.
92:						
Jonas------------------	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Large stones, slope.	Large s slope.
93:						
Kalama-----------------	Severe: slope.	Moderate: piping, wetness.	Severe: no water.	Slope----------	Slope, wetness.	Slope, wetnes
94:						
Kalama-----------------	Severe: slope.	Moderate: piping, wetness.	Severe: no water.	Slope----------	Slope, wetness.	Slope, wetnes
95:						
Kalama-----------------	Severe: slope.	Moderate: piping, wetness.	Severe: no water.	Slope----------	Slope, wetness.	Slope, wetnes
96:						
Katula-----------------	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, depth
97:						
Katula-----------------	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, depth

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrac diver
98:						
Katula	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, depth
Bunker	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope
99:						
Katula	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, depth
Bunker	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope
100:						
Kelso	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Percs slowly, slope, wetness.	Erodes percs wetnes
101:						
Kelso	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Percs slowly, slope, wetness.	Erodes slope, wetnes
102:						
Kelso	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Percs slowly, slope, wetness.	Erodes slope, wetnes
103:						
Kelso	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Percs slowly, slope, wetness.	Erodes slope, wetnes
104:						
Kosmos	Severe: seepage.	Severe: wetness.	Severe: no water.	Percs slowly	Erodes easily, percs slowly, wetness.	Erodes percs wetnes

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terrac diver
105:						
Lacamas	Moderate: slope.	Severe: hard to pack, wetness.	Severe: no water.	Slope	Slope, wetness, droughty.	Wetness
106:						
Lates	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth
107:						
Lates	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth
108:						
Lates	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock. droughty.	Slope, depth
109:						
Lithic Haplumbrepts	Severe: slope, depth to rock.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Large s slope, depth
110:						
Lithic Umbric Vitrandepts	Severe: depth to rock.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Too sanc soil b depth
111:						
Lonestar	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Fast intake, slope, soil blowing.	Slope, soil b
112:						
Lonestar	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Fast intake, slope, soil blowing.	Slope, soil b

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrac diver
113: Lonestar	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Fast intake, slope, soil blowing.	Slope, soil b
114: Lonestar	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Fast intake, slope, soil blowing.	Slope, soil b
115: Lonestar	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil b
116: Lonestar	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil b
117: Lonestar	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil b
118: Lonestar	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil b
119: Loper	Severe: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope	Erodes slope.
120: Loper	Severe: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope	Erodes slope.
121: Lytell	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, slope.	Percs s slope.
122: Lytell	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, slope.	Percs s slope.

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terrac diver
123:						
Mart	Moderate: slope.	Moderate: piping.	Severe: no water.	Deep to water	Erodes easily, percs slowly, slope.	Erodes percs
124:						
Mart	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Erodes easily, percs slowly, slope.	Erodes percs slope.
125:						
Mart	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Erodes easily, percs slowly, slope.	Erodes percs slope.
126:						
Mart	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Erodes easily, percs slowly, slope.	Erodes percs slope.
127:						
Maytown	Moderate: seepage.	Moderate: piping, wetness.	Severe: slow refill.	Flooding	Erodes easily, flooding, wetness.	Erodes wetnes
128:						
Melbourne	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope
129:						
Melbourne	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope
130:						
Minniece	Moderate: slope.	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, slope.	Slope, wetness, droughty.	Erodes percs wetnes
131:						
Mountsolo	Severe: cemented pan.	Severe: seepage, wetness.	Severe: no water.	Flooding, cemented pan, percs slowly.	Fast intake, wetness, droughty.	Cemente too sa wetnes

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terrace diver[s
132:						
Mulholland	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope---
133:						
Murnen	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope---
134:						
Natal	Slight	Severe: ponding.	Severe: slow refill.	Percs slowly, ponding.	Percs slowly, ponding.	Percs sl ponding
135:						
Newaukum	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope---
136:						
Newaukum	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope---
137:						
Newaukum	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Large st slope.
138:						
Newaukum	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Large st slope.
139:						
Newaukum	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Large st slope.
140:						
Newaukum	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Large st slope.
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth t
141:						
Newberg	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Flooding, soil blowing.	Erodes e soil bl

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrac... divers...
142: Olequa	Moderate: seepage, slope.	Slight	Severe: no water.	Deep to water	Slope	Erodes ...
143: Olequa	Severe: slope.	Slight	Severe: no water.	Deep to water	Slope	Erodes ... slope.
144: Olequa	Severe: slope.	Slight	Severe: no water.	Deep to water	Slope	Erodes ... slope.
145: Olequa	Severe: slope.	Slight	Severe: no water.	Deep to water	Slope	Erodes ... slope.
146: Olympic	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Favorab...
147: Olympic	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope...
148: Olympic	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope...
149: Olympic	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope...
150: Olympic	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope...
151: Panamaker	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, soil blowing, droughty.	Too san... soil bl...

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terrac diver
152:						
Panamaker	Moderate: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Fast intake, soil blowing, droughty.	Too san soil b
153:						
Pheeney	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, percs slowly, slope.	Large s slope, depth
154:						
Pheeney	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, percs slowly, slope.	Large s slope, depth
155:						
Pheeney	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, percs slowly, slope.	Large s slope, depth
156:						
Pheeney	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, percs slowly, slope.	Large s slope, depth
Beigle	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope
157:						
Pheeney	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, percs slowly, slope.	Large s slope, depth
Beigle	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope
158:						
Pheeney	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, percs slowly, slope.	Large s slope, depth

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrac diver
158:						
Rock outcrop-----------	Severe: slope, depth to rock.	Slight--------	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth
159:						
Pheeney----------------	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, percs slowly, slope.	Large s slope, depth
Rock outcrop-----------	Severe: slope, depth to rock.	Slight--------	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth
160:						
Pilchuck---------------	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Too san soil b
161:						
Pits-------------------	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, droughty.	Large s too sa
162:						
Polepatch--------------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Large s slope, too sa
163:						
Polepatch--------------	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, too sa
164:						
Polepatch--------------	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, too sa
165:						
Polepatch--------------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, too sa

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrac diver
166:						
Prather	Moderate: seepage.	Severe: hard to pack.	Severe: no water.	Favorable	Percs slowly, wetness.	Wetness
167:						
Prather	Severe: slope.	Severe: hard to pack.	Severe: no water.	Slope	Percs slowly, slope, wetness.	Slope, wetnes
168:						
Raught	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope--
169:						
Raught	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope--
170:						
Raught	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope--
171:						
Reichel	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope--
172:						
Riverwash	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Fast intake, wetness, droughty.	Large s too sa wetnes
173:						
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth
Rubble land	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope.

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrac[es and] diver[sions]
174:						
Rose Valley------------	Moderate: slope.	Moderate: piping, thin layer, wetness.	Severe: no water.	Frost action, slope.	Percs slowly, slope, wetness.	Erodes [...] wetnes[s]
175:						
Rose Valley------------	Severe: slope.	Moderate: piping, thin layer, wetness.	Severe: no water.	Frost action, slope.	Percs slowly, slope, wetness.	Erodes [...] slope, wetnes[s]
176:						
Salkum-----------------	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Favorab[le]
177:						
Salkum-----------------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope--
178:						
Salkum-----------------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope--
179:						
Sara-------------------	Moderate: seepage, slope.	Moderate: hard to pack, wetness.	Severe: no water.	Slope----------	Slope, wetness.	Wetness
180:						
Sara-------------------	Severe: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Slope----------	Slope, wetness.	Slope, wetnes[s]
181:						
Sara-------------------	Severe: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Slope----------	Slope, wetness.	Slope, wetnes[s]
182:						
Sara-------------------	Moderate: seepage, slope.	Moderate: hard to pack, wetness.	Severe: no water.	Slope----------	Slope, wetness.	Wetness

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrac[es and] diver[sions]
183:						
Sarazan	Severe: slope.	Moderate: seepage, piping, thin layer.	Severe: no water.	Deep to water	Slope, droughty.	Large s[tones,] slope.
184:						
Sarazan	Severe: slope.	Moderate: seepage, piping, thin layer.	Severe: no water.	Deep to water	Slope, droughty.	Large s[tones,] slope.
185:						
Sauvola	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Slope	Slope, wetness.	Wetness
186:						
Sauvola	Severe: slope.	Severe: hard to pack.	Severe: no water.	Slope	Slope, wetness.	Slope, wetness
187:						
Sauvola	Severe: slope.	Severe: hard to pack.	Severe: no water.	Slope	Slope, wetness.	Slope, wetness
188:						
Schneider	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s[tones,] slope.
189:						
Schneider	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s[tones,] slope.
190:						
Schneider	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s[tones,] slope.
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth [to rock.]

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrac diver
191:						
Schneider	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope.
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth
192:						
Seaquest	Moderate: slope.	Slight	Severe: no water.	Deep to water	Percs slowly, slope.	Percs s
193:						
Seaquest	Severe: slope.	Slight	Severe: no water.	Deep to water	Percs slowly, slope.	Percs s slope.
194:						
Seaquest	Severe: slope.	Slight	Severe: no water.	Deep to water	Percs slowly, slope.	Percs s slope.
195:						
Semiahmoo	Moderate: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Subsides, ponding.	Ponding	Ponding
196:						
Siouxon	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope.
197:						
Siouxon	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope.
198:						
Siouxon	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope.
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrac diver
199: Snohomish	Moderate: seepage.	Severe: excess humus, wetness.	Severe: slow refill.	Frost action, percs slowly, subsides.	Percs slowly, wetness.	Erodes wetnes
200: Solo	Severe: seepage.	Severe: seepage.	Severe: no water.	Cemented pan, large stones, slope.	Slope, wetness, droughty.	Cemente wetnes soil b
201: Speelyai	Severe: cemented pan.	Severe: seepage, wetness.	Severe: no water.	Cemented pan, large stones, slope.	Large stones, slope, wetness.	Cemente large wetnes
202: Speelyai	Severe: cemented pan, slope.	Severe: seepage, wetness.	Severe: no water.	Cemented pan, large stones, slope.	Large stones, slope, wetness.	Cemente large slope.
203: Spodic Cryopsamments	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Slope, too sa soil b
204: Stahl	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, depth
205: Stahl	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, depth
Reichel	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope
206: Stahl	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, depth

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terrac diver
206:						
Reichel	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope--
207:						
Stahl	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, depth
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth
208:						
Stella	Moderate: seepage, slope.	Moderate: thin layer, wetness.	Severe: no water.	Frost action, slope.	Percs slowly, slope, wetness.	Erodes wetnes
209:						
Stella	Severe: slope.	Moderate: thin layer, wetness.	Severe: no water.	Frost action, slope.	Percs slowly, slope, wetness.	Erodes slope, wetnes
210:						
Stella	Severe: slope.	Moderate: thin layer, wetness.	Severe: no water.	Frost action, slope.	Percs slowly, slope, wetness.	Erodes slope, wetnes
211:						
Studebaker	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, too sa
212:						
Swem	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Slope	Slope, wetness.	Large s slope, wetnes
213:						
Swem	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Slope	Slope, wetness.	Large s slope, wetnes

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrac[...] diver[...]
214:						
Swift	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Slope, soil b[...]
215:						
Swift	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Slope, soil b[...]
216:						
Swift	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Large s[...] slope, soil b[...]
217:						
Swift	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Large s[...] slope, soil b[...]
218:						
Swift	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Large s[...] slope, soil b[...]
219:						
Swift	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Large s[...] slope, soil b[...]
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth [...]
220:						
Swift	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Large s[...] slope, soil b[...]
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth [...]

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terrace diver
221:						
Swift	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Slope, soil bl
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth t
222:						
Vader	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope
223:						
Vader	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope
224:						
Vanson	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Large st slope, soil bl
225:						
Vanson	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Large st slope, soil bl
226:						
Vanson	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Large st slope, soil bl
227:						
Vanson	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Large st slope, soil bl
228:						
Vanson	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Large st slope, soil bl

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting Drainage	Irrigation	Terrac diver
229:						
Vanson	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, soil b
230:						
Vanson	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, soil b
231:						
Vanson	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, soil b
232:						
Vanson	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, soil b
233:						
Vanson	Severe:	Severe:	Severe:	Deep to water	Large stones, slope, droughty.	Large s slope, soil b
234:						
Vanson	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, soil b
235:						
Vanson	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, soil b
236:						
Vanson	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Large s slope, soil b
Hatchet	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, soil b

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terrac diver
237:						
Vanson	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Large s slope, soil b
Hatchet	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, soil b
238:						
Vanson	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Large s slope, soil b
Hatchet	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, soil b
239:						
Vanson	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, soil b
Hatchet	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, depth
240:						
Vanson	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, soil b
Hatchet	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, depth
241:						
Vanson	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, soil b
Hatchet	Severe: slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large s slope, depth

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrace divers
242:						
Vanson-----------------	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large st slope, soil bl
Rock outcrop-----------	Severe: slope, depth to rock.	Slight--------	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth t
243:						
Vanson-----------------	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large st slope, soil bl
Rock outcrop-----------	Severe: slope, depth to rock.	Slight--------	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth t
244:						
Vanson-----------------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Large st slope, soil bl
Rock outcrop-----------	Severe: slope, depth to rock.	Slight--------	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth t
245:						
Vanson-----------------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, droughty.	Large st slope, soil bl
Rock outcrop-----------	Severe: slope, depth to rock.	Slight--------	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth t
246:						
Voight-----------------	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope----------	Slope---
247:						
Winston----------------	Moderate: seepage, slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope----------	Too sand

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrace diver
248: Wyant	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth t
249: Wyant	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth t
250: Xana	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, soil blowing.	Slope, too sar soil bl
251: Xana	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Fast intake, slope, soil blowing.	Slope, too sar soil bl
252: Xeno	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily, slope.	Erodes e slope.
253: Xeno	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily, slope.	Erodes e slope.
254: Xerorthents	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth t
255: Yalelake	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Slope, soil bl
256: Yalelake	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Slope, soil bl
257: Yalelake	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Slope, soil bl

Table 15.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terrac[...] diver[...]
258:						
Zenker	Severe: seepage, slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Percs slowly, slope.	Percs s[...] slope.
259:						
Zenker	Severe: seepage, slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Percs slowly, slope.	Percs s[...] slope.
260:						
Zymer	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil b[...]
261:						
Zymer	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil b[...]
Rock outcrop	Severe: slope, depth to rock.	Slight	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, depth [...]
262:						
Zynbar	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Slope
263:						
Water	---	---	---	---	---	---

Table 16.--Engineering Index Properties

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				*Pct*	*Pct*					*Pct*	
1:												
Andaquepts------	0-12	Loam	ML	A-4, A-5	0	0	100	100	85-95	60-75	35-45	5-10
	12-37	Gravelly loam, very gravelly sandy loam, clay loam	ML, SM	A-4, A-5, A-2, A-6	0	0	90-100	40-95	25-85	15-75	35-45	5-15
	37-60	Clay loam, loam, clay	MH, ML	A-5, A-4, A-6, A-7	0	0	95-100	90-100	80-100	60-85	30-60	5-25
2:												
Andic Cryaquepts	0-11	Gravelly sandy loam	SM	A-1, A-2	0	0	90-100	50-75	30-50	15-30	---	NP
	11-35	Very gravelly loamy sand, very gravelly sandy loam, gravelly loam	SM, ML, SP-SM	A-2, A-1, A-3, A-4	0	0	75-95	25-75	15-70	5-55	30-40	NP-10
	35-60	Very gravelly loam, very gravelly silt loam, very cobbly sandy loam	GM	A-1, A-2, A-4	0	10-40	45-60	40-55	25-50	15-45	20-35	NP-10
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
3:												
Andic Cryumbrepts----	0-17	Gravelly loam	GM, SM	A-2, A-4	0	0-5	60-80	55-70	40-50	30-40	20-30	NP-5
	17-23	Cobbly loam, loam, silt loam	ML	A-4	0-5	0-40	90-100	80-90	70-80	60-70	25-35	NP-10
	23-39	Very cobbly loam, very cobbly clay loam, cobbly loam	SC	A-6	0-10	20-45	70-90	65-90	40-60	35-50	30-40	10-15
	39-60	Cobbly loam, loam, very cobbly clay loam	CL, SC	A-6	0-10	15-45	80-100	75-90	40-80	35-70	30-40	10-15
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
4:												
Andic Cryumbrepts----	0-5	Loamy sand	SM	A-2	0	0-5	90-100	80-90	50-75	20-30	---	NP
	5-23	Sandy loam	SM	A-2, A-4	0	0-5	90-100	80-90	50-60	30-40	25-35	NP-5
	23-35	Very cobbly loam, very cobbly clay loam	SC	A-6, A-7	0	20-45	70-90	65-90	40-60	35-50	30-45	10-20
	35-60	Cobbly loam, loam, very cobbly clay loam	CL, SC	A-6, A-7	0	15-45	80-100	75-90	40-80	35-70	30-45	10-20

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
4:												
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
5:												
Arents----------	0-10	Very gravelly sandy loam	GM, SM	A-1	0	0-5	45-60	35-50	25-40	15-20	15-25	NP-5
	10-60	Extremely gravelly sandy loam, very gravelly silt loam, gravelly loam	GM, SM	A-1, A-2, A-4	0	5-25	50-85	25-75	30-50	20-40	15-25	NP-5
6:												
Astoria---------	0-15	Silt loam	MH	A-7	0	0	95-100	95-100	85-100	80-90	50-75	10-25
	15-60	Silty clay loam, silty clay	MH	A-7	0	0	85-100	75-100	65-95	60-90	50-70	10-25
7:												
Baumgard--------	0-11	Silt loam	ML	A-4	0	0	95-100	85-90	80-85	60-70	30-40	5-10
	11-18	Silty clay loam, gravelly clay loam, gravelly silt loam	CL	A-6, A-7	0	0-10	75-90	65-85	60-80	50-75	35-45	15-20
	18-50	Gravelly clay loam, gravelly silty clay loam, very gravelly clay loam	GM, SM, ML	A-6, A-7	0	0-25	55-85	45-75	40-70	35-65	35-45	10-15
	50-54	Unweathered bedrock			0	0	---	---	---	---	---	---
8:												
Baumgard--------	0-11	Silt loam	ML	A-4	0	0	95-100	85-90	80-85	60-70	30-40	5-10
	11-18	Silty clay loam, gravelly clay loam, gravelly silt loam	CL	A-6, A-7	0	0-10	75-90	65-85	60-80	50-75	35-45	15-20
	18-50	Gravelly clay loam, gravelly silty clay loam, very gravelly clay loam	ML, GM, SM	A-6, A-7	0	0-25	55-85	45-75	40-70	35-65	35-45	10-15
	50-54	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
9:												
Beigle----------	0-13	Silt loam	MH, ML	A-5, A-4, A-6, A-7	0	0-10	90-100	85-95	80-95	60-85	30-60	NP-20
	13-42	Silt loam, gravelly silt loam, gravelly loam	MH, ML, GM, SM	A-5, A-4, A-6, A-7	0	0-15	70-100	65-95	60-90	45-80	30-60	5-25
	42-46	Very gravelly loam, very gravelly silt loam, gravelly loam	MH, GM, ML	A-2, A-6, A-4, A-5	0	10-25	50-80	40-75	35-70	30-60	30-60	5-25
	46-50	Unweathered bedrock			0	0	---	---	---	---	---	---
10:												
Beigle----------	0-13	Silt loam	MH, ML	A-5, A-6, A-4, A-7	0	0-10	90-100	85-95	80-95	60-85	30-60	NP-20
	13-42	Silt loam, gravelly silt loam, gravelly loam	GM, MH, SM, ML	A-5, A-4, A-6, A-7	0	0-15	70-100	65-95	60-90	45-80	30-60	5-25
	42-46	Very gravelly loam, very gravelly silt loam, gravelly loam	GM, MH, ML	A-2, A-4, A-6, A-5	0	10-25	50-80	40-75	35-70	30-60	30-60	5-25
	46-50	Unweathered bedrock			0	0	---	---	---	---	---	---
11:												
Boistfort-------	0-16	Silt loam	MH, ML, OL, OH	A-5, A-7	0	0	90-100	85-100	75-85	60-85	45-65	5-20
	16-27	Clay loam, silty clay loam	MH, ML	A-5, A-7	0	0	90-100	85-100	80-95	60-90	45-65	5-20
	27-60	Silty clay, clay loam, silty clay loam	MH, ML	A-7	0	0-10	90-100	85-100	75-95	65-90	40-60	10-20
12:												
Buckpeak--------	0-21	Silt loam	ML	A-4, A-6	0	0	95-100	95-100	90-100	70-85	30-40	5-15
	21-37	Silty clay loam, silt loam, loam	ML	A-6, A-7	0	0	95-100	95-100	85-95	60-85	35-50	10-20
	37-60	Silty clay loam, loam	ML	A-6, A-7	0	0	95-100	95-100	90-100	70-85	35-50	10-20
13:												
Buckpeak--------	0-21	Silt loam	ML	A-4, A-6	0	0	95-100	95-100	90-100	70-85	30-40	5-15
	21-37	Silty clay loam, silt loam, loam	ML	A-6, A-7	0	0	95-100	95-100	85-95	60-85	35-50	10-20
	37-60	Silty clay loam, loam	ML	A-6, A-7	0	0	95-100	95-100	90-100	70-85	35-50	10-20

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
14:												
Bunker----------	0-12	Silt loam	ML, MH, OH, OL	A-5, A-7	0	0	90-95	75-95	65-90	60-80	45-65	5-20
	12-27	Gravelly loam, gravelly clay loam, gravelly silt loam	MH, GM, ML, SM	A-5, A-7	0	0-5	65-75	55-70	50-65	40-55	40-60	5-20
	27-42	Loam, clay loam, gravelly silt loam	MH, ML	A-5, A-7	0	0-5	80-95	70-90	65-85	50-75	40-60	5-20
	42-46	Unweathered bedrock			0	0	---	---	---	---	---	---
15:												
Bunker----------	0-12	Silt loam	ML, OH, MH, OL	A-5, A-7	0	0	90-95	75-95	65-90	60-80	45-65	5-20
	12-27	Gravelly loam, gravelly clay loam, gravelly silt loam	MH, GM, ML, SM	A-5, A-7	0	0-5	65-75	55-70	50-65	40-55	40-60	5-20
	27-42	Loam, clay loam, gravelly silt loam	MH, ML	A-5, A-7	0	0-5	80-95	70-90	65-85	50-75	40-60	5-20
	42-46	Unweathered bedrock			0	0	---	---	---	---	---	---
16:												
Camas-----------	0-4	Cobbly loam	ML, SM	A-4	0	20-35	80-90	70-90	50-70	40-60	20-30	NP-5
	4-22	Very cobbly loam	SM	A-2, A-4	0	30-40	70-80	55-65	40-50	30-40	20-30	NP-5
	22-60	Very cobbly loamy sand	SM	A-1	0	30-45	60-80	40-65	25-35	10-20	0-14	NP
17:												
Caples----------	0-9	Silty clay loam	CL	A-6	0	0	95-100	90-100	90-100	85-95	30-40	15-25
	9-39	Silty clay loam, silty clay	CH, CL	A-7	0	0	95-100	90-100	90-95	75-90	45-55	20-30
	39-60	Silty clay loam, silty clay	CH, CL	A-7	0	0	95-100	90-100	90-95	75-90	45-55	20-30
18:												
Carrolls--------	0-7	Sand	SM, SP-SM	A-2, A-3	0	0	100	100	50-70	5-15	0-14	NP
	7-10	Very fine sandy loam, fine sandy loam	ML, SM	A-4	0	0	100	100	80-90	40-55	0-14	NP
	10-60	Loamy sand, sand	SM, SP-SM	A-2, A-3	0	0	100	100	50-75	5-25	0-14	NP
19:												
Carrolls--------	0-7	Loamy sand	SM	A-2	0	0	100	100	60-70	15-25	0-14	NP
	7-10	Very fine sandy loam, fine sandy loam	ML, SM	A-4	0	0	100	100	80-90	40-55	0-14	NP
	10-60	Loamy sand, sand	SM, SP-SM	A-2, A-3	0	0	100	100	50-75	5-25	0-14	NP
20:												
Carrolls--------	0-10	Fine sandy loam	SM	A-4	0	0	100	100	70-80	40-50	0-14	NP
	10-60	Loamy sand, sand	SM, SP-SM	A-2, A-3	0	0	100	100	50-75	5-25	0-14	NP

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*	*Pct*					*Pct*	
21:												
Centralia-------	0-10	Silt loam	CL-ML	A-4	0	0	100	95-100	85-95	70-85	20-30	5-10
	10-41	Silty clay loam, clay loam	CL	A-6	0	0	100	95-100	90-95	65-85	30-40	10-15
	41-60	Silty clay loam, clay loam, loam	CL	A-6	0	0	100	95-100	90-95	65-85	30-40	10-15
22:												
Centralia-------	0-10	Silt loam	CL-ML	A-4	0	0	100	95-100	85-95	70-85	20-30	5-10
	10-41	Silty clay loam, clay loam	CL	A-6	0	0	100	95-100	90-95	65-85	30-40	10-15
	41-60	Silty clay loam, clay loam, loam	CL	A-6	0	0	100	95-100	90-95	65-85	30-40	10-15
23:												
Centralia-------	0-10	Silt loam	CL-ML	A-4	0	0	100	95-100	85-95	70-85	20-30	5-10
	10-41	Silty clay loam, clay loam	CL	A-6	0	0	100	95-100	90-95	65-85	30-40	10-15
	41-60	Silty clay loam, clay loam, loam	CL	A-6	0	0	100	95-100	90-95	65-85	30-40	10-15
24:												
Cinebar---------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	0-14	NP
	5-21	Silt loam	MH, ML	A-4, A-5, A-7, A-6	0	0-5	85-100	80-100	75-100	70-90	35-65	NP-20
	21-60	Silt loam, loam	MH, ML	A-5, A-7	0	0-5	85-100	80-100	75-100	70-90	40-60	5-20
25:												
Cinebar---------	0-10	Silt loam	MH, ML	A-5, A-4, A-6, A-7	0	0-5	85-100	80-100	75-100	70-90	35-65	NP-20
	10-23	Silt loam	MH, ML	A-5, A-7	0	0-5	85-100	80-100	75-100	70-90	40-60	5-20
	23-60	Silt loam, loam	MH, ML	A-5, A-7	0	0-5	85-100	80-100	75-100	65-90	40-60	5-20
26:												
Cinebar---------	0-10	Silt loam	MH, ML	A-4, A-5, A-7, A-6	0	0-5	85-100	80-100	75-100	70-90	35-65	NP-20
	10-23	Silt loam	MH, ML	A-5, A-7	0	0-5	85-100	80-100	75-100	70-90	40-60	5-20
	23-60	Silt loam, loam	MH, ML	A-5, A-7	0	0-5	85-100	80-100	75-100	65-90	40-60	5-20
27:												
Cinebar---------	0-10	Silt loam	MH, ML	A-5, A-4, A-6, A-7	0	0-5	85-100	80-100	75-100	70-90	35-65	NP-20
	10-23	Silt loam	MH, ML	A-5, A-7	0	0-5	85-100	80-100	75-100	70-90	40-60	5-20
	23-60	Silt loam, loam	MH, ML	A-5, A-7	0	0-5	85-100	80-100	75-100	65-90	40-60	5-20
28:												
Cinebar---------	0-10	Silt loam	MH, ML	A-5, A-6, A-4, A-7	0	0-5	85-100	80-100	75-100	70-90	35-65	NP-20
	10-23	Silt loam	MH, ML	A-5, A-7	0	0-5	85-100	80-100	75-100	70-90	40-60	5-20
	23-60	Silt loam, loam	MH, ML	A-5, A-7	0	0-5	85-100	80-100	75-100	65-90	40-60	5-20
29:												
Cinnamon--------	0-3	Sandy loam	SM	A-2, A-4	0	0	100	90-100	55-70	30-40	30-40	NP-5
	3-22	Loamy sand, sandy loam	SM	A-2, A-1, A-4	0	0	100	90-100	45-75	15-40	25-35	NP-5
	22-60	Sandy loam, loam	ML, SM	A-2, A-4	0	0	85-100	75-90	55-85	30-55	30-40	NP-5

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
30:												
Cinnamon--------	0-3	Sandy loam	SM	A-2, A-4	0	0	100	90-100	55-70	30-40	30-40	NP-5
	3-22	Loamy sand, sandy loam	SM	A-2, A-1, A-4	0	0	100	90-100	45-75	15-40	25-35	NP-5
	22-60	Sandy loam, loam	ML, SM	A-2, A-4	0	0	85-100	75-90	55-85	30-55	30-40	NP-5
31:												
Cinnamon--------	0-3	Sandy loam	SM	A-2, A-4	0	0	100	90-100	55-70	30-40	30-40	NP-5
	3-22	Loamy sand, sandy loam	SM	A-1, A-2, A-4	0	0	100	90-100	45-75	15-40	25-35	NP-5
	22-60	Sandy loam, loam	ML, SM	A-2, A-4	0	0	85-100	75-90	55-85	30-55	30-40	NP-5
32:												
Clato-----------	0-11	Silt loam	ML	A-4	0	0	100	100	95-100	75-90	20-30	NP-5
	11-80	Silt loam	ML	A-4	0	0	100	100	95-100	75-90	20-30	NP-5
33:												
Coweeman--------	0-7	Silt loam	CL	A-6	0	0	95-100	90-100	80-95	75-90	25-35	10-15
	7-14	Silty clay loam, silty clay	CL, CH, MH, ML	A-7	0	0	85-100	75-100	70-95	65-90	40-55	15-25
	14-70	Clay	CH, CL	A-7	0	0	85-100	75-100	70-95	65-90	45-65	20-35
34:												
Coweeman--------	0-7	Silty clay loam	CL	A-6	0	0	95-100	90-100	80-95	75-90	35-40	15-20
	7-14	Silty clay loam, silty clay	CH, CL, ML, MH	A-7	0	0	85-100	75-100	70-95	65-90	40-55	15-25
	14-70	Clay	CH, CL	A-7	0	0	85-100	75-100	70-95	65-90	45-65	20-35
35:												
Cowlitz---------	0-10	Very gravelly sand	GM, GP-GM	A-1	0	10-25	35-55	30-50	25-35	5-15	0-14	NP
	10-60	Extremely gravelly loamy sand, extremely gravelly sand, very gravelly loamy sand	GP, GP-GM	A-1	0	10-25	30-40	25-35	20-25	0-10	0-14	NP
36:												
Cowlitz---------	0-11	Extremely gravelly sand	GP	A-1	0	0-10	15-30	10-25	5-20	0-5	0-14	NP
	11-60	Very gravelly sand, very gravelly loamy sand, extremely gravelly sand	GP-GM, SP, GP, SP-SM	A-1	0	0-25	20-60	10-50	5-35	0-10	0-14	NP
37:												
Cowlitz---------	0-11	Extremely gravelly sand	GP	A-1	0	0-10	15-30	10-25	5-20	0-5	0-14	NP
	11-60	Very gravelly sand, very gravelly loamy sand, extremely gravelly sand	GP, GP-GM, SP-SM, SP	A-1	0	0-25	20-60	10-50	5-35	0-10	0-14	NP

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*	*Pct*					*Pct*	
38:												
Cowlitz----------	0-11	Extremely gravelly sand	GP	A-1	0	0-10	15-30	10-25	5-20	0-5	0-14	NP
	11-60	Very gravelly sand, very gravelly loamy sand, extremely gravelly sand	GP-GM, GP, SP, SP-SM	A-1	0	0-25	20-60	10-50	5-35	0-10	0-14	NP
39:												
Delameter--------	0-10	Extremely gravelly loamy sand	GM, GP-GM, SP-SM, SM	A-1	0	20-50	50-80	30-50	20-35	5-15	0-14	NP
	10-60	Very gravelly loamy sand, extremely gravelly loamy sand, extremely cobbly sand	GP, GP-GM	A-1	0-2	20-50	20-50	15-40	10-25	0-10	0-14	NP
40:												
Dobbs-----------	0-4	Gravelly silt loam	ML, OH, MH, OL	A-5, A-7	0	0	70-85	60-75	55-75	50-65	45-65	5-20
	4-14	Gravelly silt loam	ML, MH, OH, OL	A-5, A-7	0	0	70-85	60-75	55-75	50-65	45-60	5-20
	14-35	Gravelly loam, very gravelly sandy loam, very gravelly silt loam	GM, SM	A-5, A-2, A-7	0	10-25	45-75	35-65	25-50	15-40	40-60	5-20
	35-60	Cemented			0	0	---	---	---	---	---	---
41:												
Dobbs-----------	0-4	Gravelly silt loam	MH, ML, OL, OH	A-5, A-7	0	0	70-85	60-75	55-75	50-65	45-65	5-20
	4-14	Gravelly silt loam	MH, OL, ML, OH	A-5, A-7	0	0	70-85	60-75	55-75	50-65	45-60	5-20
	14-35	Gravelly loam, very gravelly sandy loam, very gravelly silt loam	GM, SM	A-5, A-2, A-7	0	10-25	45-75	35-65	25-50	15-40	40-60	5-20
	35-60	Cemented			0	0	---	---	---	---	---	---
42:												
Domell----------	0-5	Loamy sand	SM	A-2	0	0	90-100	90-100	50-75	20-30	0-14	NP
	5-13	Sandy loam	SM	A-2	0	0	95-100	85-90	50-65	25-35	35-65	NP-20
	13-39	Gravelly loam, fine sandy loam, sandy loam	ML, MH, SM	A-2, A-4, A-7, A-5	0	0-15	85-95	65-90	40-85	30-70	35-65	NP-20
	39-60	Sandy loam, loam, gravelly loam	ML, MH, SM	A-2, A-7, A-4, A-5	0	0-15	85-95	65-90	40-85	30-70	35-65	NP-20

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
43:												
Domell----------	0-8	Sandy loam	SM	A-2	0	0	95-100	85-90	50-65	25-35	35-65	NP-20
	8-23	Loam, fine sandy loam, sandy loam	ML, MH, SM	A-2, A-4, A-7, A-5	0	0	90-100	80-90	40-85	30-70	35-65	NP-20
	23-60	Sandy loam, loam, gravelly loam	ML, MH, SM	A-4, A-2, A-5, A-7	0	0-15	85-95	65-90	40-85	30-70	35-65	NP-20
44:												
Domell----------	0-8	Sandy loam	SM	A-2	0	0	95-100	85-90	50-65	25-35	35-65	NP-20
	8-23	Loam, fine sandy loam, sandy loam	MH, ML, SM	A-4, A-2, A-5, A-7	0	0	90-100	80-90	40-85	30-70	35-65	NP-20
	23-60	Sandy loam, loam, gravelly loam	ML, MH, SM	A-2, A-4, A-7, A-5	0	0-15	85-95	65-90	40-85	30-70	35-65	NP-20
45:												
Domell----------	0-12	Stony sandy loam	SM	A-2	2-5	10-15	85-95	80-90	50-60	25-30	35-65	NP-20
	12-23	Gravelly loam, fine sandy loam, sandy loam	MH, ML, SM	A-2, A-4, A-7, A-5	0	0-15	85-95	65-90	40-85	30-70	35-65	NP-20
	23-60	Sandy loam, loam, gravelly loam	ML, MH, SM	A-2, A-7, A-4, A-5	0	0-15	85-95	65-90	40-85	30-70	35-65	NP-20
46:												
Domell----------	0-12	Stony sandy loam	SM	A-2	2-5	10-15	85-95	80-90	50-60	25-30	35-65	NP-20
	12-23	Gravelly loam, fine sandy loam, sandy loam	MH, ML, SM	A-2, A-4, A-7, A-5	0	0-15	85-95	65-90	40-85	30-70	35-65	NP-20
	23-60	Sandy loam, loam, gravelly loam	ML, MH, SM	A-4, A-2, A-5, A-7	0	0-15	85-95	65-90	40-85	30-70	35-65	NP-20
47:												
Edgewick--------	0-4	Silt loam	ML	A-4	0	0	90-100	85-100	70-80	50-60	15-25	NP-5
	4-25	Fine sandy loam, silt loam, loam	SM	A-2, A-4	0	0	90-100	85-100	60-80	30-50	15-25	NP-5
	25-32	Loamy sand, sand, sandy loam	SM	A-2	0	0	90-100	75-100	60-80	15-35	0-14	NP
	32-60	Very gravelly sand, very gravelly loamy sand, very gravelly coarse sand	GM, GP-GM, SP-SM, SM	A-1	0	0	50-70	25-50	20-40	5-15	0-14	NP

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
48:												
Elkprairie------	0-6	Loamy sand	SM	A-2	0	0	90-100	80-90	50-75	20-30	---	NP
	6-17	Sand, gravelly sand, gravelly coarse sand	SM, SP-SM	A-2, A-3	0	0-5	80-90	60-85	50-70	5-15	---	NP
	17-23	Very gravelly loamy sand, very gravelly sand, loamy sand	SM, SP-SM	A-1	0	0-5	70-90	45-85	20-40	5-20	---	NP
	23-36	Gravelly loam, gravelly sandy loam, fine sandy loam	ML, SM	A-2, A-1, A-4	0	0-5	70-90	60-80	35-70	20-55	30-40	NP-5
	36-60	Loam	MH, ML	A-5, A-7	0	0-5	85-100	80-100	75-100	65-90	40-60	5-20
49:												
Elochoman-------	0-12	Silt loam	ML, OH, MH, OL	A-5	0	0	100	100	95-100	95-100	45-65	NP-10
	12-26	Silt loam	MH, ML	A-5	0	0	100	100	90-95	85-90	45-65	NP-10
	26-60	Silt loam, loam	MH, ML	A-4, A-5	0	0	100	100	85-90	80-85	35-60	NP-20
50:												
Ferteg----------	0-6	Silt loam	MH, ML, OL, OH	A-5, A-4, A-6, A-7	0	0	100	100	90-100	70-90	35-65	NP-20
	6-25	Silt loam	MH, ML	A-4, A-5, A-7, A-6	0	0	100	100	90-100	70-90	35-60	5-20
	25-34	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	90-100	85-100	70-95	30-45	10-20
	34-60	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	90-100	85-100	75-95	40-55	15-30
51:												
Ferteg----------	0-6	Silt loam	ML, MH, OH, OL	A-4, A-7, A-5, A-6	0	0	100	100	90-100	70-90	35-65	NP-20
	6-25	Silt loam	MH, ML	A-5, A-4, A-6, A-7	0	0	100	100	90-100	70-90	35-60	5-20
	25-34	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	90-100	85-100	70-95	30-45	10-20
	34-60	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	90-100	85-100	75-95	40-55	15-30
52:												
Forsyth---------	0-7	Very cobbly loamy sand	SM	A-1, A-2	10-25	10-30	80-95	70-90	45-60	15-30	0-14	NP
	7-60	Very gravelly sand, extremely cobbly sand, extremely stony sand	GP, SP-SM, GP-GM, SP	A-1	20-35	20-40	35-60	10-45	5-30	0-10	0-14	NP

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
53:												
Forsyth---------	0-7	Very cobbly loamy sand	SM	A-1, A-2	10-25	10-30	80-95	70-90	45-60	15-30	0-14	NP
	7-60	Very gravelly sand, extremely cobbly sand, extremely stony sand	GP, GP-GM, SP-SM, SP	A-1	20-35	20-40	35-60	10-45	5-30	0-10	0-14	NP
54:												
Germany---------	0-22	Silt loam	ML, MH, OH, OL	A-5, A-7	0	0	100	95-100	80-100	75-90	45-65	5-20
	22-49	Silt loam, silty clay loam	MH, ML	A-5, A-7	0	0	100	95-100	80-100	75-90	40-60	5-20
	49-72	Silt loam, silty clay loam	MH, ML	A-5, A-7	0	0	100	95-100	80-100	75-90	40-60	5-20
55:												
Germany---------	0-22	Silt loam	MH, ML, OL, OH	A-5, A-7	0	0	100	95-100	80-100	75-90	45-65	5-20
	22-49	Silt loam, silty clay loam	MH, ML	A-5, A-7	0	0	100	95-100	80-100	75-90	40-60	5-20
	49-72	Silt loam, silty clay loam	MH, ML	A-5, A-7	0	0	100	95-100	80-100	75-90	40-60	5-20
56:												
Germany---------	0-22	Silt loam	MH, ML, OL, OH	A-5, A-7	0	0	100	95-100	80-100	75-90	45-65	5-20
	22-49	Silt loam, silty clay loam	MH, ML	A-5, A-7	0	0	100	95-100	80-100	75-90	40-60	5-20
	49-72	Silt loam, silty clay loam	MH, ML	A-5, A-7	0	0	100	95-100	80-100	75-90	40-60	5-20
57:												
Germany---------	0-22	Silt loam	ML, MH, OH, OL	A-5, A-7	0	0	100	95-100	80-100	75-90	45-65	5-20
	22-49	Silt loam, silty clay loam	MH, ML	A-5, A-7	0	0	100	95-100	80-100	75-90	40-60	5-20
	49-72	Silt loam, silty clay loam	MH, ML	A-5, A-7	0	0	100	95-100	80-100	75-90	40-60	5-20
58:												
Germany---------	0-22	Silt loam	ML, OH, MH, OL	A-5, A-7	0	0	100	95-100	80-100	75-90	45-65	5-20
	22-49	Silt loam, silty clay loam	MH, ML	A-5, A-7	0	0	100	95-100	80-100	75-90	40-60	5-20
	49-59	Weathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
59:												
Germany	0-22	Silt loam	MH, ML, OL, OH	A-5, A-7	0	0	100	95-100	80-100	75-90	45-65	5-20
	22-49	Silt loam, silty clay loam	MH, ML	A-5, A-7	0	0	100	95-100	80-100	75-90	40-60	5-20
	49-59	Weathered bedrock			0	0	---	---	---	---	---	---
60:												
Germany	0-22	Silt loam	ML, MH, OH, OL	A-5, A-7	0	0	100	95-100	80-100	75-90	45-65	5-20
	22-49	Silt loam, silty clay loam	MH, ML	A-5, A-7	0	0	100	95-100	80-100	75-90	40-60	5-20
	49-59	Weathered bedrock			0	0	---	---	---	---	---	---
61:												
Gobar	0-10	Silt loam	ML	A-4	0	0	95-100	90-100	85-100	65-85	30-40	NP-10
	10-46	Silt loam, silty clay loam, clay loam	ML	A-4, A-5, A-7, A-6	0	0	95-100	90-100	90-100	70-90	35-45	5-15
	46-56	Weathered bedrock			0	0	---	---	---	---	---	---
62:												
Gobar	0-10	Silt loam	ML	A-4	0	0	95-100	90-100	85-100	65-85	30-40	NP-10
	10-46	Silt loam, silty clay loam, clay loam	ML	A-5, A-4, A-6, A-7	0	0	95-100	90-100	90-100	70-90	35-45	5-15
	46-56	Weathered bedrock			0	0	---	---	---	---	---	---
63:												
Gobar	0-10	Silt loam	ML	A-4	0	0	95-100	90-100	85-100	65-85	30-40	NP-10
	10-46	Silt loam, silty clay loam, clay loam	ML	A-4, A-7, A-5, A-6	0	0	95-100	90-100	90-100	70-90	35-45	5-15
	46-56	Weathered bedrock			0	0	---	---	---	---	---	---
64:												
Gobar	0-10	Silt loam	ML	A-4	0	0	95-100	90-100	85-100	65-85	30-40	NP-10
	10-46	Silt loam, silty clay loam, clay loam	ML	A-5, A-6, A-4, A-7	0	0	95-100	90-100	90-100	70-90	35-45	5-15
	46-56	Weathered bedrock			0	0	---	---	---	---	---	---
65:												
Godfrey	0-5	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	80-95	25-35	5-15
	5-27	Silty clay loam, silty clay, clay	MH, ML	A-7	0	0	100	100	90-100	80-95	40-55	15-25
	27-60	Sandy clay, silty clay, clay	MH, ML	A-7	0	0	100	100	80-95	50-90	40-55	15-25

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				*Pct*	*Pct*					*Pct*	
66:												
Greenwater------	0-8	Loamy sand	SM	A-1, A-2	0	0	90-100	75-100	40-65	10-25	0-14	NP
	8-22	Loamy sand, sand, fine sand	SM, SP-SM	A-2, A-1, A-3	0	0	90-100	75-100	40-65	5-25	0-14	NP
	22-60	Sand, coarse sand, fine sand	SM, SP-SM	A-2, A-1, A-3	0	0	90-100	75-100	40-60	5-15	0-14	NP
67:												
Greenwater------	0-8	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	0-14	NP
	8-22	Loamy sand, sand, fine sand	SM, SP-SM	A-2, A-1, A-3	0	0	90-100	75-100	40-65	5-25	0-14	NP
	22-60	Sand, fine sand, coarse sand	SM, SP-SM	A-2, A-1, A-3	0	0	90-100	75-100	40-60	5-15	0-14	NP
68:												
Greenwater------	0-8	Gravelly loamy sand	SM	A-1	0	0	60-80	50-75	30-40	10-20	0-14	NP
	8-19	Loamy sand, sand, fine sand	SM, SP-SM	A-1, A-2, A-3	0	0	90-100	75-100	40-65	5-25	0-14	NP
	19-60	Sand, coarse sand, fine sand	SM, SP-SM	A-2, A-1, A-3	0	0	90-100	75-100	40-60	5-15	0-14	NP
69:												
Greenwater------	0-8	Fine sandy loam	SM	A-2	0	0	90-100	75-100	50-70	15-35	10-15	NP
	8-22	Loamy sand, sand, fine sand	SM, SP-SM	A-1, A-2, A-3	0	0	90-100	75-100	40-65	5-25	0-14	NP
	22-60	Sand, coarse sand, fine sand	SM, SP-SM	A-2, A-1, A-3	0	0	90-100	75-100	40-60	5-15	0-14	NP
70:												
Hatchet---------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	---	NP
	5-23	Extremely cobbly loam, very cobbly loam	GM, SM	A-1, A-2	10-30	25-60	50-70	30-50	25-45	20-35	30-40	NP-5
	23-38	Extremely cobbly clay loam, extremely cobbly sandy loam, extremely cobbly loam	GM, GP-GM	A-1	25-35	55-60	35-50	15-35	10-25	5-20	30-40	NP-5
	38-42	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
71:												
Hatchet---------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	---	NP
	5-23	Extremely cobbly loam, very cobbly loam	GM, SM	A-1, A-2	10-30	25-60	50-70	30-50	25-45	20-35	30-40	NP-5
	23-38	Extremely cobbly clay loam, extremely cobbly sandy loam, extremely cobbly loam	GM, GP-GM	A-1	25-35	55-60	35-50	15-35	10-25	5-20	30-40	NP-5
	38-42	Unweathered bedrock			0	0	---	---	---	---	---	---
72:												
Hatchet---------	0-11	Very cobbly sandy loam	GM, SM	A-1, A-2	0-1	20-40	45-70	45-65	30-45	15-25	25-45	NP-10
	11-21	Extremely cobbly loam	GM	A-1, A-2	0-5	55-60	35-65	30-50	25-45	20-35	25-45	NP-10
	21-36	Extremely cobbly sandy loam, extremely cobbly loam, extremely cobbly clay loam	GP, GM, GP-GM	A-1, A-2	0-5	55-60	30-50	10-20	5-15	0-15	25-45	NP-10
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---
73:												
Hatchet---------	0-11	Very cobbly sandy loam	GM, SM	A-1, A-2	0-1	20-40	45-70	45-65	30-45	15-25	25-45	NP-10
	11-21	Extremely cobbly loam	GM	A-1, A-2	0-5	55-60	35-65	30-50	25-45	20-35	25-45	NP-10
	21-36	Extremely cobbly sandy loam, extremely cobbly loam, extremely cobbly clay loam	GP, GM, GP-GM	A-1, A-2	0-5	55-60	30-50	10-20	5-15	0-15	25-45	NP-10
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
74:												
Hatchet---------	0-11	Very cobbly sandy loam	GM, SM	A-1, A-2	0-1	20-40	45-70	45-65	30-45	15-25	25-45	NP-10
	11-21	Extremely cobbly loam	GM	A-1, A-2	0-5	55-60	35-65	30-50	25-45	20-35	25-45	NP-10
	21-36	Extremely cobbly sandy loam, extremely cobbly loam, extremely cobbly clay loam	GP, GM, GP-GM	A-1, A-2	0-5	55-60	30-50	10-20	5-15	0-15	25-45	NP-10
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
75:												
Hatchet---------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	---	NP
	5-23	Extremely cobbly loam, very cobbly loam	GM, SM	A-1, A-2	10-30	25-60	50-70	30-50	25-45	20-35	30-40	NP-5
	23-38	Extremely cobbly clay loam, extremely cobbly sandy loam, extremely cobbly loam	GM, GP-GM	A-1	25-35	55-60	35-50	15-35	10-25	5-20	30-40	NP-5
	38-42	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
76:												
Hazeldell-------	0-7	Gravelly silt loam	CL, ML	A-6, A-7	0	0	70-85	60-75	55-75	50-65	30-50	10-20
	7-28	Gravelly clay loam, gravelly loam	CL, ML	A-6, A-7	0	0-15	75-85	60-75	55-70	40-50	30-50	10-20
	28-40	Gravelly clay loam, gravelly loam, very gravelly clay loam	SC, SM	A-4, A-7, A-5, A-6	0-5	0-15	50-85	45-75	40-70	35-50	30-45	5-20
	40-60	Gravelly clay loam, gravelly clay, very gravelly clay loam	GC, ML, CL, SC	A-5, A-4, A-6, A-7	0	0-5	50-80	45-75	40-70	35-60	30-45	5-20

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				*Pct*	*Pct*					*Pct*	
77:												
Hazeldell-------	0-7	Gravelly silt loam	CL, ML	A-6, A-7	0	0	70-85	60-75	55-75	50-65	30-50	10-20
	7-28	Gravelly clay loam, gravelly loam	CL, ML	A-6, A-7	0	0-15	75-85	60-75	55-70	40-50	30-50	10-20
	28-40	Gravelly clay loam, gravelly loam, very gravelly clay loam	SC, SM	A-4, A-7, A-5, A-6	0-5	0-15	50-85	45-75	40-70	35-50	30-45	5-20
	40-60	Gravelly clay loam, gravelly clay, very gravelly clay loam	GC, CL, ML, SC	A-5, A-4, A-6, A-7	0	0-5	50-80	45-75	40-70	35-60	30-45	5-20
78:												
Hazeldell-------	0-7	Gravelly silt loam	CL, ML	A-6, A-7	0	0	70-85	60-75	55-75	50-65	30-50	10-20
	7-28	Gravelly clay loam, gravelly loam	CL, ML	A-6, A-7	0	0-15	75-85	60-75	55-70	40-50	30-50	10-20
	28-40	Gravelly clay loam, gravelly loam, very gravelly clay loam	SC, SM	A-5, A-4, A-6, A-7	0-5	0-15	50-85	45-75	40-70	35-50	30-45	5-20
	40-60	Gravelly clay loam, gravelly clay, very gravelly clay loam	CL, GC, SC, ML	A-5, A-4, A-6, A-7	0	0-5	50-80	45-75	40-70	35-60	30-45	5-20
79:												
Hazeldell-------	0-7	Gravelly silt loam	CL, ML	A-6, A-7	0	0	70-85	60-75	55-75	50-65	30-50	10-20
	7-28	Gravelly clay loam, gravelly loam	GC, GM	A-2	0-5	0-15	75-85	60-75	55-70	35-50	30-45	5-20
	28-40	Gravelly clay loam, gravelly loam, very gravelly clay loam	GC	A-2	0	0-5	50-80	45-60	25-50	10-35	30-45	5-20
	40-50	Very gravelly clay loam		A-2	0	0	40-60	30-50	10-25	5-20	30-45	5-20
	50-60	Weathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
80:												
Hazeldell-------	0-7	Gravelly silt loam	CL, ML	A-6, A-7	0	0	70-85	60-75	55-75	50-65	30-50	10-20
	7-28	Gravelly clay loam, gravelly loam	GC, GM	A-2	0-5	0-15	75-85	60-75	55-70	35-50	30-45	5-20
	28-40	Gravelly clay loam, gravelly loam, very gravelly clay loam	GC	A-2	0	0-5	50-80	45-60	25-50	10-35	30-45	5-20
	40-50	Very gravelly clay loam		A-2	0	0	40-60	30-50	10-25	5-20	30-45	5-20
	50-60	Weathered bedrock			0	0	---	---	---	---	---	---
81:												
Histic Cryaquepts-----	0-13	Muck	PT	A-8	0	0	---	---	---	---	---	NP
	13-21	Loamy sand	SM	A-2, A-4	0	0	100	90-100	60-80	20-40	---	NP
	21-31	Gravelly sandy loam, sandy loam, very gravelly sandy loam	GM, SM	A-2, A-1, A-4	0	0	60-90	40-85	30-60	15-40	---	NP
	31-35	Muck	PT	A-8	0	0	---	---	---	---	---	NP
	35-60	Gravelly coarse sand, very gravelly coarse sand	SP-SM	A-1	0	0	80-90	45-70	20-30	5-10	---	NP
82:												
Histic Humaquepts-----	0-8	Muck	PT	A-8	0	0	---	---	---	---	50-100	NP-5
	8-20	Gravelly sandy loam, loam, gravelly loam	GC-GM, GM, SM, SC-SM	A-2, A-1, A-4	0	0-5	55-85	50-80	30-60	15-50	15-30	NP-10
	20-60	Stratified extremely gravelly sand to gravelly sandy loam	GM, SP, GP, SM	A-1, A-2	0	0-15	45-70	25-55	15-35	0-20	15-30	NP-10

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
83:												
Hoffstadt-------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	0-14	NP
	5-9	Very gravelly sandy loam	GM, SM	A-1, A-2	0	15-25	50-70	45-60	30-40	15-20	25-45	NP-10
	9-15	Very gravelly sandy loam, very cobbly sandy loam	GM, SP-SM, GP-GM, SM	A-1, A-2	0	20-30	45-70	40-60	25-40	5-20	25-45	NP-10
	15-23	Very cobbly sandy loam, very stony sandy loam, extremely stony sandy loam	GP-GM, SM, GM, SP-SM	A-1, A-2	10-35	20-50	35-65	15-60	10-40	5-20	25-45	NP-10
	23-52	Extremely stony sandy loam, extremely cobbly sandy loam	GP-GM, SM, GM, SP-SM	A-1, A-2	10-45	55-70	25-80	15-75	10-50	5-25	25-45	NP-10
	52-56	Unweathered bedrock			0	0	---	---	---	---	---	---
84:												
Hoffstadt-------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	0-14	NP
	5-9	Very gravelly sandy loam	GM, SM	A-1, A-2	0	15-25	50-70	45-60	30-40	15-20	25-45	NP-10
	9-15	Very gravelly sandy loam, very cobbly sandy loam	GP-GM, SM, GM, SP-SM	A-1, A-2	0	20-30	45-70	40-60	25-40	5-20	25-45	NP-10
	15-23	Very cobbly sandy loam, very stony sandy loam, extremely stony sandy loam	GP-GM, GM, SM, SP-SM	A-1, A-2	10-35	20-50	35-65	15-60	10-40	5-20	25-45	NP-10
	23-52	Extremely stony sandy loam, extremely cobbly sandy loam	GM, GP-GM, SP-SM, SM	A-1, A-2	10-45	55-70	25-80	15-75	10-50	5-25	25-45	NP-10
	52-56	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
85:												
Hoffstadt-------	0-4	Very gravelly sandy loam	GM, SM	A-1, A-2	0	15-25	50-70	45-60	30-40	15-20	25-45	NP-10
	4-10	Very gravelly sandy loam, very cobbly sandy loam	GP-GM, GM, SM, SP-SM	A-1, A-2	10-20	20-30	45-70	40-60	25-40	5-20	25-45	NP-10
	10-19	Very cobbly sandy loam, very stony sandy loam, extremely stony sandy loam	GP-GM, GM, SM, SP-SM	A-1, A-2	10-30	30-85	35-65	15-60	10-40	5-20	25-45	NP-10
	19-47	Extremely stony sandy loam, extremely cobbly sandy loam	GM, GP-GM, SP-SM, SM	A-1, A-2	10-30	75-85	25-80	15-75	10-50	5-25	25-45	NP-10
	47-51	Unweathered bedrock			0	0	---	---	---	---	---	---
86:												
Hoffstadt-------	0-4	Very gravelly sandy loam	GM, SM	A-1, A-2	0	15-25	50-70	45-60	30-40	15-20	25-45	NP-10
	4-10	Very gravelly sandy loam, very cobbly sandy loam	GM, GP-GM, SP-SM, SM	A-1, A-2	10-20	20-30	45-70	40-60	25-40	5-20	25-45	NP-10
	10-19	Very cobbly sandy loam, very stony sandy loam, extremely stony sandy loam	GP-GM, GM, SM, SP-SM	A-1, A-2	10-30	30-85	35-65	15-60	10-40	5-20	25-45	NP-10
	19-47	Extremely stony sandy loam, extremely cobbly sandy loam	GM, SP-SM, GP-GM, SM	A-1, A-2	10-30	75-85	25-80	15-75	10-50	5-25	25-45	NP-10
	47-51	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				*Pct*	*Pct*					*Pct*	
87:												
Hoffstadt-------	0-4	Very gravelly sandy loam	GM, SM	A-1, A-2	0	15-25	50-70	45-60	30-40	15-20	25-45	NP-10
	4-10	Very gravelly sandy loam, very cobbly sandy loam	GP-GM, GM, SM, SP-SM	A-1, A-2	10-20	20-30	45-70	40-60	25-40	5-20	25-45	NP-10
	10-19	Very cobbly sandy loam, very stony sandy loam, extremely stony sandy loam	GM, SP-SM, GP-GM, SM	A-1, A-2	10-30	30-85	35-65	15-60	10-40	5-20	25-45	NP-10
	19-47	Extremely stony sandy loam, extremely cobbly sandy loam	GP-GM, SM, GM, SP-SM	A-1, A-2	10-30	75-85	25-80	15-75	10-50	5-25	25-45	NP-10
	47-51	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
88:												
Hoffstadt-------	0-4	Very gravelly sandy loam	GM, SM	A-1, A-2	0	15-25	50-70	45-60	30-40	15-20	25-45	NP-10
	4-10	Very gravelly sandy loam, very cobbly sandy loam	GP-GM, SM, GM, SP-SM	A-1, A-2	10-20	20-30	45-70	40-60	25-40	5-20	25-45	NP-10
	10-19	Very cobbly sandy loam, very stony sandy loam, extremely stony sandy loam	GP-GM, GM, SM, SP-SM	A-1, A-2	10-30	30-85	35-65	15-60	10-40	5-20	25-45	NP-10
	19-47	Extremely stony sandy loam, extremely cobbly sandy loam	GP-GM, GM, SM, SP-SM	A-1, A-2	10-30	75-85	25-80	15-75	10-50	5-25	25-45	NP-10
	47-51	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*	*Pct*					*Pct*	
89:												
Hoffstadt-------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	0-14	NP
	5-9	Very gravelly sandy loam	GM, SM	A-1, A-2	0	15-25	50-70	45-60	30-40	15-20	25-45	NP-10
	9-15	Very gravelly sandy loam, very cobbly sandy loam	GP-GM, GM, SM, SP-SM	A-1, A-2	0	20-30	45-70	40-60	25-40	5-20	25-45	NP-10
	15-23	Very cobbly sandy loam, very stony sandy loam, extremely stony sandy loam	GP-GM, GM, SM, SP-SM	A-1, A-2	10-35	20-50	35-65	15-60	10-40	5-20	25-45	NP-10
	23-52	Extremely stony sandy loam, extremely cobbly sandy loam	GM, SP-SM, GP-GM, SM	A-1, A-2	10-45	55-70	25-80	15-75	10-50	5-25	25-45	NP-10
	52-56	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
90:												
Hoffstadt-------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	0-14	NP
	5-9	Very gravelly sandy loam	GM, SM	A-1, A-2	0	15-25	50-70	45-60	30-40	15-20	25-45	NP-10
	9-15	Very gravelly sandy loam, very cobbly sandy loam	GM, SP-SM, GP-GM, SM	A-1, A-2	0	20-30	45-70	40-60	25-40	5-20	25-45	NP-10
	15-23	Very cobbly sandy loam, very stony sandy loam, extremely stony sandy loam	GP-GM, SM, GM, SP-SM	A-1, A-2	10-35	20-50	35-65	15-60	10-40	5-20	25-45	NP-10
	23-52	Extremely stony sandy loam, extremely cobbly sandy loam	GP-GM, GM, SM, SP-SM	A-1, A-2	10-45	55-70	25-80	15-75	10-50	5-25	25-45	NP-10
	52-56	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
91:												
Jonas-----------	0-8	Silt loam	MH, ML	A-5, A-7	0	0-5	90-100	85-100	75-90	60-85	40-65	5-20
	8-18	Very cobbly silt loam, very cobbly loam, very gravelly silt loam	GM, SM	A-5, A-2, A-7	0	20-45	50-75	45-60	40-55	30-45	40-65	5-20
	18-60	Cobbly loam, cobbly clay loam, gravelly clay loam	MH, ML	A-5, A-7	0	10-30	90-95	70-80	65-75	50-65	40-60	5-20

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*	*Pct*					*Pct*	
92:												
Jonas-----------	0-8	Silt loam	MH, ML	A-5, A-7	0	0-5	90-100	85-100	75-90	60-85	40-65	5-20
	8-18	Very cobbly silt loam, very cobbly loam, very gravelly silt loam	GM, SM	A-2, A-5, A-7	0	20-45	50-75	45-60	40-55	30-45	40-65	5-20
	18-60	Cobbly loam, cobbly clay loam, gravelly clay loam	MH, ML	A-5, A-7	0	10-30	90-95	70-80	65-75	50-65	40-60	5-20
93:												
Kalama----------	0-7	Gravelly loam	GM, SM	A-4	0	0	60-80	50-75	40-60	35-50	20-30	NP-5
	7-17	Gravelly silt loam, gravelly loam	GC-GM, CL-ML, GM, ML	A-4	0	0	60-80	50-75	50-70	35-60	20-30	NP-10
	17-21	Gravelly loam, gravelly clay loam, gravelly silty clay loam	GC, CL, ML, SC	A-6, A-7	0	0	60-80	50-75	50-70	35-60	35-45	10-20
	21-31	Gravelly clay loam, gravelly loam	GC, CL, ML, SC	A-6, A-7	0	0	60-80	50-70	45-65	35-60	35-45	10-20
	31-60	Very gravelly clay loam, gravelly clay loam, very gravelly loam	GC, GM	A-6, A-2, A-7	0	0-5	50-75	40-65	35-60	30-50	35-45	10-20
94:												
Kalama----------	0-7	Gravelly loam	GM, SM	A-4	0	0	60-80	50-75	40-60	35-50	20-30	NP-5
	7-17	Gravelly silt loam, gravelly loam	GC-GM, GM, CL-ML, ML	A-4	0	0	60-80	50-75	50-70	35-60	20-30	NP-10
	17-21	Gravelly loam, gravelly clay loam, gravelly silty clay loam	GC, CL, ML, SC	A-6, A-7	0	0	60-80	50-75	50-70	35-60	35-45	10-20
	21-31	Gravelly clay loam, gravelly loam	CL, GC, SC, ML	A-6, A-7	0	0	60-80	50-70	45-65	35-60	35-45	10-20
	31-60	Very gravelly clay loam, gravelly clay loam, very gravelly loam	GC, GM	A-2, A-7, A-6	0	0-5	50-75	40-65	35-60	30-50	35-45	10-20

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
95:												
Kalama----------	0-7	Gravelly loam	GM, SM	A-4	0	0	60-80	50-75	40-60	35-50	20-30	NP-5
	7-17	Gravelly silt loam, gravelly loam	GC-GM, CL-ML, GM, ML	A-4	0	0	60-80	50-75	50-70	35-60	20-30	NP-10
	17-21	Gravelly loam, gravelly clay loam, gravelly silty clay loam	GC, CL, ML, SC	A-6, A-7	0	0	60-80	50-75	50-70	35-60	35-45	10-20
	21-31	Gravelly clay loam, gravelly loam	GC, CL, ML, SC	A-6, A-7	0	0	60-80	50-70	45-65	35-60	35-45	10-20
	31-60	Very gravelly clay loam, gravelly clay loam, very gravelly loam	GC, GM	A-2, A-7, A-6	0	0-5	50-75	40-65	35-60	30-50	35-45	10-20
96:												
Katula----------	0-5	Very cobbly loam	GM, SM	A-5, A-7	0-5	50-60	60-80	55-75	50-70	35-50	45-65	5-20
	5-15	Very cobbly loam, very cobbly clay loam, extremely cobbly loam	GM	A-2, A-7, A-5	0-5	50-60	35-60	20-55	15-45	15-40	45-65	5-20
	15-30	Extremely cobbly clay loam, extremely cobbly loam	GM	A-2, A-7, A-5	0-5	55-80	30-60	20-50	15-45	15-40	40-60	5-20
	30-34	Unweathered bedrock			0	0	---	---	---	---	---	---
97:												
Katula----------	0-5	Very cobbly loam	GM, SM	A-5, A-7	0-5	50-60	60-80	55-75	50-70	35-50	45-65	5-20
	5-15	Very cobbly loam, very cobbly clay loam, extremely cobbly loam	GM	A-5, A-2, A-7	0-5	50-60	35-60	20-55	15-45	15-40	45-65	5-20
	15-30	Extremely cobbly clay loam, extremely cobbly loam	GM	A-5, A-2, A-7	0-5	55-80	30-60	20-50	15-45	15-40	40-60	5-20
	30-34	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
98:												
Katula----------	0-5	Very cobbly loam	GM, SM	A-5, A-7	0-5	50-60	60-80	55-75	50-70	35-50	45-65	5-20
	5-15	Very cobbly loam, very cobbly clay loam, extremely cobbly loam	GM	A-2, A-7, A-5	0-5	50-60	35-60	20-55	15-45	15-40	45-65	5-20
	15-30	Extremely cobbly clay loam, extremely cobbly loam	GM	A-2, A-5, A-7	0-5	55-80	30-60	20-50	15-45	15-40	40-60	5-20
	30-34	Unweathered bedrock			0	0	---	---	---	---	---	---
Bunker----------	0-12	Silt loam	MH, ML, OL, OH	A-5, A-7	0	0	90-95	75-95	65-90	60-80	45-65	5-20
	12-27	Gravelly loam, gravelly clay loam, gravelly silt loam	GM, SM, MH, ML	A-5, A-7	0	0-5	65-75	55-70	50-65	40-55	40-60	5-20
	27-42	Loam, clay loam, gravelly silt loam	MH, ML	A-5, A-7	0	0-5	80-95	70-90	65-85	50-75	40-60	5-20
	42-46	Unweathered bedrock			0	0	---	---	---	---	---	---
99:												
Katula----------	0-5	Very cobbly loam	GM, SM	A-5, A-7	0-5	50-60	60-80	55-75	50-70	35-50	45-65	5-20
	5-15	Very cobbly loam, very cobbly clay loam, extremely cobbly loam	GM	A-2, A-5, A-7	0-5	50-60	35-60	20-55	15-45	15-40	45-65	5-20
	15-30	Extremely cobbly clay loam, extremely cobbly loam	GM	A-5, A-2, A-7	0-5	55-80	30-60	20-50	15-45	15-40	40-60	5-20
	30-34	Unweathered bedrock			0	0	---	---	---	---	---	---
Bunker----------	0-12	Silt loam	ML, OH, MH, OL	A-5, A-7	0	0	90-95	75-95	65-90	60-80	45-65	5-20
	12-27	Gravelly loam, gravelly clay loam, gravelly silt loam	MH, GM, ML, SM	A-5, A-7	0	0-5	65-75	55-70	50-65	40-55	40-60	5-20
	27-42	Loam, clay loam, gravelly silt loam	MH, ML	A-5, A-7	0	0-5	80-95	70-90	65-85	50-75	40-60	5-20
	42-46	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
100:												
Kelso-----------	0-11	Silt loam	ML	A-4	0	0	100	100	95-100	80-90	20-25	NP-5
	11-34	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	80-90	25-35	5-15
	34-60	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	80-90	25-35	5-15
101:												
Kelso-----------	0-11	Silt loam	ML	A-4	0	0	100	100	95-100	80-90	20-25	NP-5
	11-34	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	80-90	25-35	5-15
	34-60	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	80-90	25-35	5-15
102:												
Kelso-----------	0-11	Silt loam	ML	A-4	0	0	100	100	95-100	80-90	20-25	NP-5
	11-34	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	80-90	25-35	5-15
	34-60	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	80-90	25-35	5-15
103:												
Kelso-----------	0-11	Silt loam	ML	A-4	0	0	100	100	95-100	80-90	20-25	NP-5
	11-34	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	80-90	25-35	5-15
	34-60	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	80-90	25-35	5-15
104:												
Kosmos----------	0-7	Silt loam	CL-ML	A-4	0	0	100	100	90-100	70-80	20-30	5-10
	7-12	Silty clay loam, silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	80-90	25-35	5-15
	12-47	Sandy clay loam, silty clay loam, clay loam	CL, SC	A-6	0	0	100	90-100	50-95	40-85	30-40	10-20
	47-60	Coarse sandy loam, sandy loam, sandy clay loam	SC-SM, SM	A-2, A-4	0	0	95-100	85-100	40-50	30-40	15-30	NP-10
105:												
Lacamas---------	0-4	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	70-90	20-35	5-15
	4-10	Silt loam, silty clay loam	ML	A-6, A-4, A-7	0	0	100	100	90-100	70-90	30-45	5-15
	10-20	Silty clay, clay	CH	A-7	0	0	100	100	90-100	90-95	60-70	40-50
	20-60	Silty clay, clay	CH	A-7	0	0	95-100	90-100	85-95	80-90	60-70	40-50

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
106:												
Lates-----------	0-12	Silt loam	MH, ML, OL, OH	A-5, A-7	0	0	95-100	95-100	85-95	65-85	45-65	5-20
	12-36	Gravelly silt loam, gravelly loam	GM, SM	A-5, A-7	0	0	65-75	65-75	55-60	45-50	45-60	5-20
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---
107:												
Lates-----------	0-12	Silt loam	ML, MH, OH, OL	A-5, A-7	0	0	95-100	95-100	85-95	65-85	45-65	5-20
	12-36	Gravelly silt loam, gravelly loam	GM, SM	A-5, A-7	0	0	65-75	65-75	55-60	45-50	45-60	5-20
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---
108:												
Lates-----------	0-12	Silt loam	ML, MH, OH, OL	A-5, A-7	0	0	95-100	95-100	85-95	65-85	45-65	5-20
	12-36	Gravelly silt loam, gravelly loam	GM, SM	A-5, A-7	0	0	65-75	65-75	55-60	45-50	45-60	5-20
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
109:												
Lithic Haplumbrepts---	0-8	Gravelly sandy loam	SM	A-1, A-4, A-2	0	0-5	65-85	55-75	40-60	20-40	0-14	NP
	8-20	Gravelly clay loam, cobbly clay loam, gravelly loam	ML, SM	A-4, A-7, A-6	0	10-25	70-95	65-80	55-75	40-65	30-45	5-15
	20-24	Unweathered bedrock			0	0	---	---	---	---	---	---
110:												
Lithic Umbric Vitrandepts----	0-6	Sandy loam	SM	A-4	0	0	90-100	80-90	60-70	40-50	30-35	NP-5
	6-11	Very gravelly loamy sand, gravelly loamy sand	SM	A-1, A-2	0	0	75-95	30-75	20-55	10-20	---	NP
	11-15	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
111:												
Lonestar--------	0-2	Sand	SM, SP-SM	A-1, A-2	0	0	90-100	75-100	40-60	5-15	---	NP
	2-17	Sandy loam, gravelly sandy loam	SM	A-1, A-2	0	0-5	80-90	50-85	35-60	20-35	25-35	NP-5
	17-24	Gravelly loamy sand, loamy sand, gravelly sand	SM, SP-SM	A-1	0	0-5	70-90	30-85	20-40	5-20	0-14	NP
	24-60	Gravelly loam, gravelly sandy loam, sandy loam	ML, SM	A-1, A-2, A-4	0	0-5	70-90	60-75	35-70	20-55	30-40	NP-5
112:												
Lonestar--------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	80-90	50-75	20-30	0-14	NP
	5-17	Gravelly sandy loam, sandy loam	SM	A-1, A-2	0	0-5	80-90	50-85	35-60	20-35	25-35	NP-5
	17-24	Gravelly sandy loam, sandy loam	SM	A-1, A-2	0	0-5	80-90	50-85	35-60	20-35	25-35	NP-5
	24-30	Gravelly loamy sand, loamy sand, gravelly sand	SM, SP-SM	A-1	0	0-5	70-90	50-85	20-40	5-20	0-14	NP
	30-60	Gravelly loam, gravelly sandy loam	ML, SM	A-1, A-2, A-4	0	0-5	70-90	60-75	35-70	20-55	30-40	NP-5
113:												
Lonestar--------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	80-90	50-75	20-30	0-14	NP
	5-17	Gravelly sandy loam, sandy loam	SM	A-1, A-2	0	0-5	80-90	50-85	35-60	20-35	25-35	NP-5
	17-24	Gravelly sandy loam, sandy loam	SM	A-1, A-2	0	0-5	80-90	50-85	35-60	20-35	25-35	NP-5
	24-30	Gravelly loamy sand, loamy sand, gravelly sand	SM, SP-SM	A-1	0	0-5	70-90	50-85	20-40	5-20	0-14	NP
	30-60	Gravelly loam, gravelly sandy loam	ML, SM	A-2, A-1, A-4	0	0-5	70-90	60-75	35-70	20-55	30-40	NP-5
114:												
Lonestar--------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	80-90	50-75	20-30	0-14	NP
	5-17	Gravelly sandy loam, sandy loam	SM	A-1, A-2	0	0-5	80-90	50-85	35-60	20-35	25-35	NP-5
	17-24	Gravelly sandy loam, sandy loam	SM	A-1, A-2	0	0-5	80-90	50-85	35-60	20-35	25-35	NP-5
	24-30	Gravelly loamy sand, loamy sand, gravelly sand	SM, SP-SM	A-1	0	0-5	70-90	50-85	20-40	5-20	0-14	NP
	30-60	Gravelly loam, gravelly sandy loam	ML, SM	A-2, A-1, A-4	0	0-5	70-90	60-75	35-70	20-55	30-40	NP-5

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
115:												
Lonestar--------	0-10	Sandy loam	SM	A-1, A-2	0	0	85-100	70-100	45-65	10-25	0-14	NP
	10-17	Sandy loam, gravelly sandy loam	SM	A-1, A-2	0	0-5	80-90	50-85	35-60	20-35	25-35	NP-5
	17-24	Gravelly loamy sand, loamy sand, gravelly sand	SM, SP-SM	A-1	0	0-5	70-90	30-85	20-40	5-20	0-14	NP
	24-60	Gravelly loam, gravelly sandy loam, sandy loam	ML, SM	A-1, A-2, A-4	0	0-5	70-90	60-75	35-70	20-55	30-40	NP-5
116:												
Lonestar--------	0-10	Sandy loam	SM	A-1, A-2	0	0	85-100	70-100	45-65	10-25	0-14	NP
	10-17	Sandy loam, gravelly sandy loam	SM	A-1, A-2	0	0-5	80-90	50-85	35-60	20-35	25-35	NP-5
	17-24	Gravelly loamy sand, loamy sand, gravelly sand	SM, SP-SM	A-1	0	0-5	70-90	30-85	20-40	5-20	0-14	NP
	24-60	Gravelly loam, gravelly sandy loam, sandy loam	ML, SM	A-2, A-1, A-4	0	0-5	70-90	60-75	35-70	20-55	30-40	NP-5
117:												
Lonestar--------	0-10	Sandy loam	SM	A-1, A-2	0	0	85-100	70-100	45-65	10-25	0-14	NP
	10-17	Sandy loam, gravelly sandy loam	SM	A-1, A-2	0	0-5	80-90	50-85	35-60	20-35	25-35	NP-5
	17-24	Gravelly loamy sand, loamy sand, gravelly sand	SM, SP-SM	A-1	0	0-5	70-90	30-85	20-40	5-20	0-14	NP
	24-60	Gravelly loam, gravelly sandy loam, sandy loam	ML, SM	A-1, A-4, A-2	0	0-5	70-90	60-75	35-70	20-55	30-40	NP-5
118:												
Lonestar--------	0-10	Sandy loam	SM	A-1, A-2	0	0	85-100	70-100	45-65	10-25	0-14	NP
	10-17	Sandy loam, gravelly sandy loam	SM	A-1, A-2	0	0-5	80-90	50-85	35-60	20-35	25-35	NP-5
	17-24	Gravelly loamy sand, loamy sand, gravelly sand	SM, SP-SM	A-1	0	0-5	70-90	30-85	20-40	5-20	0-14	NP
	24-30	Gravelly loam, gravelly sandy loam, loamy sand	ML, SM	A-1, A-2, A-4	0	0-5	70-90	60-75	35-70	20-55	30-40	NP-5
	30-50	Gravelly sandy loam	ML	A-4	0	0	90-100	85-100	75-100	50-90	30-40	NP-5
	50-54	Weathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
119:												
Loper-----------	0-12	Silt loam	ML, MH, OH, OL	A-5	0	0-15	95-100	95-100	60-75	50-60	40-60	NP-10
	12-28	Loam	ML, MH, OH, OL	A-5, A-7	0	0-10	100	90-100	70-80	60-75	40-60	NP-15
	28-60	Clay loam, clay	CH, CL	A-7	0	0	85-100	75-100	60-95	50-85	40-75	20-40
120:												
Loper-----------	0-12	Silt loam	ML, MH, OH, OL	A-5	0	0-15	95-100	95-100	60-75	50-60	40-60	NP-10
	12-28	Loam	MH, OL, ML, OH	A-5, A-7	0	0-10	100	90-100	70-80	60-75	40-60	NP-15
	28-60	Clay loam, clay	CH, CL	A-7	0	0	85-100	75-100	60-95	50-85	40-75	20-40
121:												
Lytell----------	0-12	Silt loam	ML, OH, MH, OL	A-5, A-7	0	0	100	100	90-100	90-95	45-65	5-20
	12-18	Silt loam, silty clay loam	ML, MH, OH, OL	A-5, A-7	0	0	100	100	90-100	90-95	45-65	5-20
	18-55	Silty clay loam, clay loam	MH, ML	A-7	0	0	100	100	90-95	85-95	40-60	10-20
	55-65	Weathered bedrock			0	0	---	---	---	---	---	---
122:												
Lytell----------	0-12	Silt loam	ML, MH, OH, OL	A-5, A-7	0	0	100	100	90-100	90-95	45-65	5-20
	12-18	Silt loam, silty clay loam	MH, OL, ML, OH	A-5, A-7	0	0	100	100	90-100	90-95	45-65	5-20
	18-55	Silty clay loam, clay loam	MH, ML	A-7	0	0	100	100	90-95	85-95	40-60	10-20
	55-65	Weathered bedrock			0	0	---	---	---	---	---	---
123:												
Mart------------	0-11	Silt loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	85-95	85-95	25-35	5-15
	11-20	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	85-95	80-90	25-35	5-15
	20-40	Silty clay loam	CL	A-6, A-7	0	0	90-100	85-100	85-100	80-90	30-45	10-20
	40-72	Silty clay loam, silt loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	85-95	80-90	25-35	5-15
124:												
Mart------------	0-11	Silt loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	85-95	85-95	25-35	5-15
	11-20	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	85-95	80-90	25-35	5-15
	20-40	Silty clay loam	CL	A-6, A-7	0	0	90-100	85-100	85-100	80-90	30-45	10-20
	40-72	Silty clay loam, silt loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	85-95	80-90	25-35	5-15

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
125:												
Mart	0-11	Silt loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	85-95	85-95	25-35	5-15
	11-20	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	85-95	80-90	25-35	5-15
	20-40	Silty clay loam	CL	A-6, A-7	0	0	90-100	85-100	85-100	80-90	30-45	10-20
	40-72	Silty clay loam, silt loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	85-95	80-90	25-35	5-15
126:												
Mart	0-11	Silt loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	85-95	85-95	25-35	5-15
	11-20	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	85-95	80-90	25-35	5-15
	20-40	Silty clay loam	CL	A-6, A-7	0	0	90-100	85-100	85-100	80-90	30-45	10-20
	40-72	Silty clay loam, silt loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	85-95	80-90	25-35	5-15
127:												
Maytown	0-18	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	70-90	25-35	5-15
	18-36	Silt loam, silty clay loam	CL	A-6	0	0	100	100	95-100	80-95	30-40	10-20
	36-60	Silty clay loam, silt loam	CL	A-6	0	0	100	100	95-100	80-95	30-40	10-20
128:												
Melbourne	0-10	Loam	ML	A-4	0	0	95-100	95-100	90-100	75-95	30-40	5-10
	10-18	Clay loam, silty clay loam	MH, ML	A-7	0	0	95-100	95-100	95-100	80-95	40-60	10-25
	18-35	Silty clay, clay, silty clay loam	MH, ML	A-7	0	0	95-100	95-100	95-100	80-95	40-60	10-30
	35-60	Silty clay loam, clay loam, silty clay	MH, ML	A-7	0	0	95-100	95-100	95-100	80-95	40-60	10-30
129:												
Melbourne	0-10	Loam	ML	A-4	0	0	95-100	95-100	90-100	75-95	30-40	5-10
	10-18	Clay loam, silty clay loam	MH, ML	A-7	0	0	95-100	95-100	95-100	80-95	40-60	10-25
	18-35	Silty clay, clay, silty clay loam	MH, ML	A-7	0	0	95-100	95-100	95-100	80-95	40-60	10-30
	35-60	Silty clay loam, clay loam, silty clay	MH, ML	A-7	0	0	95-100	95-100	95-100	80-95	40-60	10-30
130:												
Minniece	0-12	Silt loam	CL-ML	A-4	0	0	100	100	90-100	80-95	25-30	5-10
	12-42	Clay, silty clay	MH	A-7	0	0-5	100	90-100	85-95	75-85	50-60	15-25
	42-60	Clay, silty clay loam, clay loam	MH	A-7	0	0-5	100	90-100	85-95	65-90	50-60	15-20

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
131:												
Mountsolo-------	0-12	Gravelly sand	SM	A-1, A-2	0	0-5	60-80	50-75	35-55	15-25	---	NP
	12-48	Cemented			0	0	---	---	---	---	---	---
	48-60	Cemented			0	0	---	---	---	---	---	---
132:												
Mulholland------	0-12	Silt loam	ML	A-4	0	0	100	90-100	80-100	70-90	30-40	NP-10
	12-52	Silt loam, silty clay loam, clay loam	MH, ML	A-7	0	0	95-100	90-100	80-95	70-90	40-60	10-30
	52-60	Silt loam, silty clay loam, clay loam	MH, ML	A-7	0	0	90-100	80-100	75-95	65-90	40-60	10-30
133:												
Murnen----------	0-13	Silt loam	MH, OL, ML, OH	A-5, A-7	0	0	95-100	85-100	80-100	75-90	45-65	5-20
	13-60	Silt loam, loam	MH, ML	A-5, A-7	0	0	85-100	75-100	70-100	55-85	40-60	5-20
134:												
Natal-----------	0-9	Silty clay loam	CL	A-6	0	0	100	95-100	95-100	85-95	35-45	15-25
	9-64	Silty clay, clay	CH	A-7	0	0	100	95-100	85-100	75-95	50-60	25-35
135:												
Newaukum--------	0-8	Gravelly silt loam	MH, ML, OL, OH	A-4, A-5, A-7	0	0	70-85	60-75	55-75	50-65	35-65	NP-20
	8-41	Gravelly silt loam, gravelly loam	MH	A-7	0	0-15	70-80	60-75	55-70	50-65	50-70	10-25
	41-51	Weathered bedrock			0	0	---	---	---	---	35-60	NP-20
136:												
Newaukum--------	0-8	Gravelly silt loam	ML, MH, OH, OL	A-4, A-5, A-7	0	0	70-85	60-75	55-75	50-65	35-65	NP-20
	8-41	Gravelly silt loam, gravelly loam	MH	A-7	0	0-15	70-80	60-75	55-70	50-65	50-70	10-25
	41-51	Weathered bedrock			0	0	---	---	---	---	35-60	NP-20
137:												
Newaukum--------	0-8	Cobbly silt loam	MH, ML, OL, OH	A-5, A-4, A-6, A-7	0-2	15-25	90-100	85-95	70-80	60-70	35-65	NP-20
	8-41	Gravelly silt loam, gravelly loam	MH	A-7	0	0-15	70-80	60-75	55-70	50-65	50-70	10-25
	41-60	Gravelly silt loam, gravelly loam	MH	A-7	0	0-15	70-80	60-75	55-70	50-65	50-70	10-25

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				*Pct*	*Pct*					*Pct*	
138:												
Newaukum--------	0-8	Cobbly silt loam	MH, OL, ML, OH	A-4, A-7, A-5, A-6	0-2	15-25	90-100	85-95	70-80	60-70	35-65	NP-20
	8-41	Gravelly silt loam, gravelly loam	MH	A-7	0	0-15	70-80	60-75	55-70	50-65	50-70	10-25
	41-60	Gravelly silt loam, gravelly loam	MH	A-7	0	0-15	70-80	60-75	55-70	50-65	50-70	10-25
139:												
Newaukum--------	0-8	Cobbly silt loam	MH, ML, OL, OH	A-4, A-5, A-7, A-6	0-2	15-25	90-100	85-95	70-80	60-70	35-65	NP-20
	8-41	Gravelly silt loam, gravelly loam	MH	A-7	0	0-15	70-80	60-75	55-70	50-65	50-70	10-25
	41-60	Gravelly silt loam, gravelly loam	MH	A-7	0	0-15	70-80	60-75	55-70	50-65	50-70	10-25
140:												
Newaukum--------	0-8	Cobbly silt loam	ML, OH, MH, OL	A-5, A-4, A-6, A-7	0-2	15-25	90-100	85-95	70-80	60-70	35-65	NP-20
	8-41	Gravelly silt loam, gravelly loam	MH	A-7	0	0-15	70-80	60-75	55-70	50-65	50-70	10-25
	41-60	Gravelly silt loam, very gravelly loam, very cobbly silt loam	GM, MH, SM, ML	A-4, A-7, A-5, A-6	0-5	10-60	40-80	35-75	30-60	25-55	35-60	NP-20
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
141:												
Newberg---------	0-10	Fine sandy loam	SM	A-2, A-4	0	0	100	100	60-85	30-50	20-25	NP-5
	10-28	Very fine sandy loam, sandy loam, fine sandy loam	SM	A-2, A-4	0	0	90-100	85-100	40-85	25-50	20-25	NP-5
	28-60	Fine sandy loam, loamy fine sand, loamy very fine sand	SM	A-1, A-2, A-4	0	0	80-100	80-100	45-85	15-40	0-14	NP
142:												
Olequa----------	0-8	Silt loam	ML	A-4	0	0	100	100	95-100	70-90	25-35	NP-10
	8-20	Silt loam	ML	A-4	0	0	100	100	95-100	75-90	25-35	NP-10
	20-60	Silty clay loam, silt loam	CL	A-7	0	0	100	100	95-100	85-95	40-50	15-25
143:												
Olequa----------	0-8	Silt loam	ML	A-4	0	0	100	100	95-100	70-90	25-35	NP-10
	8-20	Silt loam	ML	A-4	0	0	100	100	95-100	75-90	25-35	NP-10
	20-60	Silty clay loam, silt loam	CL	A-7	0	0	100	100	95-100	85-95	40-50	15-25

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				*Pct*	*Pct*					*Pct*	
144:												
Olequa----------	0-8	Silt loam	ML	A-4	0	0	100	100	95-100	70-90	25-35	NP-10
	8-20	Silt loam	ML	A-4	0	0	100	100	95-100	75-90	25-35	NP-10
	20-60	Silty clay loam, silt loam	CL	A-7	0	0	100	100	95-100	85-95	40-50	15-25
145:												
Olequa----------	0-8	Silt loam	ML	A-4	0	0	100	100	95-100	70-90	25-35	NP-10
	8-20	Silt loam	ML	A-4	0	0	100	100	95-100	75-90	25-35	NP-10
	20-60	Silty clay loam, silt loam	CL	A-7	0	0	100	100	95-100	85-95	40-50	15-25
146:												
Olympic---------	0-4	Silt loam	MH, ML	A-5, A-7	0	0	100	100	90-100	75-95	45-60	5-15
	4-14	Silt loam, clay loam, silty clay loam	MH, ML	A-6, A-7	0	0	100	100	90-100	70-95	35-55	10-20
	14-38	Silty clay loam, silty clay, clay	MH, ML	A-7	0	0	95-100	95-100	90-100	70-95	45-70	10-25
	38-60	Silty clay, clay	MH, ML	A-5, A-7	0	0	95-100	95-100	90-100	70-95	45-70	5-30
147:												
Olympic---------	0-4	Silt loam	MH, ML	A-5, A-7	0	0	100	100	90-100	75-95	45-60	5-15
	4-14	Silt loam, clay loam, silty clay loam	MH, ML	A-6, A-7	0	0	100	100	90-100	70-95	35-55	10-20
	14-38	Silty clay loam, silty clay, clay	MH, ML	A-7	0	0	95-100	95-100	90-100	70-95	45-70	10-25
	38-60	Silty clay, clay	MH, ML	A-5, A-7	0	0	95-100	95-100	90-100	70-95	45-70	5-30
148:												
Olympic---------	0-4	Silt loam	MH, ML	A-5, A-7	0	0	100	100	90-100	75-95	45-60	5-15
	4-14	Silt loam, clay loam, silty clay loam	MH, ML	A-6, A-7	0	0	100	100	90-100	70-95	35-55	10-20
	14-38	Silty clay loam, silty clay, clay	MH, ML	A-7	0	0	95-100	95-100	90-100	70-95	45-70	10-25
	38-60	Silty clay, clay	MH, ML	A-5, A-7	0	0	95-100	95-100	90-100	70-95	45-70	5-30
149:												
Olympic---------	0-4	Silt loam	MH, ML	A-5, A-7	0	0	100	100	90-100	75-95	45-60	5-15
	4-14	Silt loam, clay loam, silty clay loam	MH, ML	A-6, A-7	0	0	100	100	90-100	70-95	35-55	10-20
	14-38	Silty clay loam, silty clay, clay	MH, ML	A-7	0	0	95-100	95-100	90-100	70-95	45-70	10-25
	38-60	Silty clay, clay	MH, ML	A-5, A-7	0	0	95-100	95-100	90-100	70-95	45-70	5-30

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*	*Pct*					*Pct*	
150:												
Olympic---------	0-8	Silt loam	MH, ML	A-5, A-7	0	0	100	100	90-100	75-95	45-60	5-15
	8-24	Silt loam, clay loam, silty clay loam	MH, ML	A-6, A-7	0	0	100	100	90-100	70-95	35-55	10-20
	24-50	Silty clay loam, silty clay, clay	MH, ML	A-7	0	0	95-100	95-100	90-100	70-95	45-70	10-25
	50-60	Weathered bedrock			0	0	---	---	---	---	45-70	5-30
151:												
Panamaker-------	0-3	Gravelly sand	SP-SM	A-1, A-3, A-2	0	0	60-85	50-75	35-55	5-10	0-14	NP
	3-60	Sand, gravelly sand, loamy sand	SM, SP-SM	A-1, A-2, A-3	0	0	60-100	50-90	35-60	5-20	0-14	NP
152:												
Panamaker-------	0-6	Gravelly sand	SP-SM	A-2, A-1, A-3	0	0	60-85	50-75	35-55	5-10	0-14	NP
	6-60	Loamy sand, sand	SM	A-1, A-2	0	0	100	90-100	45-65	10-20	0-14	NP
153:												
Pheeney---------	0-7	Gravelly silt loam	ML, MH, SM	A-5, A-7	0	0	70-80	55-75	50-70	35-55	40-60	5-20
	7-15	Gravelly silt loam, gravelly loam	ML, MH, SM	A-5, A-7	0	0	70-80	55-75	50-70	35-55	40-60	5-20
	15-36	Very gravelly loam, extremely cobbly silt loam, extremely gravelly loam	GM	A-2, A-1, A-5, A-7	0	15-65	35-65	25-60	20-55	15-45	40-60	5-20
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---
154:												
Pheeney---------	0-7	Gravelly silt loam	ML, MH, SM	A-5, A-7	0	0	70-80	55-75	50-70	35-55	40-60	5-20
	7-15	Gravelly silt loam, gravelly loam	ML, MH, SM	A-5, A-7	0	0	70-80	55-75	50-70	35-55	40-60	5-20
	15-36	Very gravelly loam, extremely cobbly silt loam, extremely gravelly loam	GM	A-2, A-5, A-1, A-7	0	15-65	35-65	25-60	20-55	15-45	40-60	5-20
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
155:												
Pheeney---------	0-7	Gravelly silt loam	MH, ML, SM	A-5, A-7	0	0	70-80	55-75	50-70	35-55	40-60	5-20
	7-15	Gravelly silt loam, gravelly loam	ML, MH, SM	A-5, A-7	0	0	70-80	55-75	50-70	35-55	40-60	5-20
	15-36	Very gravelly loam, extremely cobbly silt loam, extremely gravelly loam	GM	A-2, A-1, A-5, A-7	0	15-65	35-65	25-60	20-55	15-45	40-60	5-20
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---
156:												
Pheeney---------	0-7	Gravelly silt loam	MH, ML, SM	A-5, A-7	0	0	70-80	55-75	50-70	35-55	40-60	5-20
	7-15	Gravelly silt loam, gravelly loam	ML, MH, SM	A-5, A-7	0	0	70-80	55-75	50-70	35-55	40-60	5-20
	15-36	Very gravelly loam, extremely cobbly silt loam, extremely gravelly loam	GM	A-1, A-7, A-2, A-5	0	15-65	35-65	25-60	20-55	15-45	40-60	5-20
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---
Beigle----------	0-13	Silt loam	MH, ML	A-5, A-4, A-6, A-7	0	0-10	90-100	85-95	80-95	60-85	30-60	NP-20
	13-42	Silt loam, gravelly silt loam, gravelly loam	MH, GM, ML, SM	A-4, A-7, A-5, A-6	0	0-15	70-100	65-95	60-90	45-80	30-60	5-25
	42-46	Very gravelly loam, very gravelly silt loam, gravelly loam	GM, MH, ML	A-2, A-6, A-4, A-5	0	10-25	50-80	40-75	35-70	30-60	30-60	5-25
	46-50	Unweathered bedrock			0	0	---	---	---	---	---	---
157:												
Pheeney---------	0-7	Gravelly silt loam	MH, ML, SM	A-5, A-7	0	0	70-80	55-75	50-70	35-55	40-60	5-20
	7-15	Gravelly silt loam, gravelly loam	MH, ML, SM	A-5, A-7	0	0	70-80	55-75	50-70	35-55	40-60	5-20
	15-36	Very gravelly loam, extremely cobbly silt loam, extremely gravelly loam	GM	A-1, A-7, A-2, A-5	0	15-65	35-65	25-60	20-55	15-45	40-60	5-20
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
157:												
Beigle----------	0-13	Silt loam	MH, ML	A-5, A-4, A-6, A-7	0	0-10	90-100	85-95	80-95	60-85	30-60	NP-20
	13-42	Silt loam, gravelly silt loam, gravelly loam	GM, MH, SM, ML	A-5, A-4, A-6, A-7	0	0-15	70-100	65-95	60-90	45-80	30-60	5-25
	42-46	Very gravelly loam, very gravelly silt loam, gravelly loam	GM, MH, ML	A-2, A-6, A-4, A-5	0	10-25	50-80	40-75	35-70	30-60	30-60	5-25
	46-50	Unweathered bedrock			0	0	---	---	---	---	---	---
158:												
Pheeney---------	0-7	Gravelly silt loam	ML, MH, SM	A-5, A-7	0	0	70-80	55-75	50-70	35-55	40-60	5-20
	7-15	Gravelly silt loam, gravelly loam	ML, MH, SM	A-5, A-7	0	0	70-80	55-75	50-70	35-55	40-60	5-20
	15-36	Very gravelly loam, extremely cobbly silt loam, extremely gravelly loam	GM	A-2, A-5, A-1, A-7	0	15-65	35-65	25-60	20-55	15-45	40-60	5-20
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
159:												
Pheeney---------	0-7	Gravelly silt loam	MH, ML, SM	A-5, A-7	0	0	70-80	55-75	50-70	35-55	40-60	5-20
	7-15	Gravelly silt loam, gravelly loam	ML, MH, SM	A-5, A-7	0	0	70-80	55-75	50-70	35-55	40-60	5-20
	15-36	Very gravelly loam, extremely cobbly silt loam, extremely gravelly loam	GM	A-2, A-1, A-5, A-7	0	15-65	35-65	25-60	20-55	15-45	40-60	5-20
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
160:												
Pilchuck--------	0-12	Loamy fine sand	SM	A-2	0	0	80-100	75-100	65-80	15-35	0-14	NP
	12-36	Sand, fine sand, loamy fine sand	SM	A-2	0	0	80-100	75-100	50-80	15-35	0-14	NP
	36-60	Gravelly sand, very gravelly sand, gravelly coarse sand	GP, SP	A-1	0	5-15	35-80	30-75	10-40	0-5	0-14	NP

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
161:												
Pits------------	0-6	Extremely gravelly sand	GP, GW	A-1	0-5	0-25	10-25	5-25	0-15	0-5	0-14	NP
	6-60	Extremely gravelly sand, extremely gravelly coarse sand, very gravelly coarse sand	GP, SW, GW, SP	A-1	0-5	0-25	10-55	5-50	0-15	0-5	0-14	NP
162:												
Polepatch-------	0-7	Loamy sand	SM	A-2	0	0-5	90-100	80-90	50-75	20-30	0-14	NP
	7-12	Very cobbly loamy sand	GM, SM	A-1	0-5	35-45	50-80	40-70	25-40	10-15	0-14	NP
	12-60	Extremely cobbly loamy sand, extremely stony coarse sand, extremely cobbly sand	GP, GP-GM	A-1	25-35	15-35	20-50	10-45	5-30	0-5	0-14	NP
163:												
Polepatch-------	0-5	Very cobbly loamy sand	GM, SM	A-1	0-5	35-45	50-80	40-70	25-40	10-15	0-14	NP
	5-60	Extremely cobbly sand, extremely stony coarse sand, extremely cobbly loamy sand	GP, GP-GM	A-1	25-35	15-35	20-50	10-45	5-30	0-10	0-14	NP
164:												
Polepatch-------	0-5	Very cobbly loamy sand	GM, SM	A-1	0-5	35-45	50-80	40-70	25-40	10-15	0-14	NP
	5-60	Extremely cobbly sand, extremely stony coarse sand, extremely cobbly loamy sand	GP, GP-GM	A-1	25-35	15-35	20-50	10-45	5-30	0-10	0-14	NP
165:												
Polepatch-------	0-5	Extremely bouldery loamy sand	GM, SM	A-1	25-35	5-15	55-80	40-65	20-50	10-20	0-14	NP
	5-60	Extremely cobbly sand, extremely stony coarse sand, extremely cobbly loamy sand	GP, GP-GM	A-1	25-35	15-35	20-50	10-45	5-30	0-10	0-14	NP

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				*Pct*	*Pct*					*Pct*	
166:												
Prather---------	0-13	Silty clay loam	CL, ML	A-6, A-7	0	0	100	100	95-100	85-95	35-45	10-20
	13-43	Silty clay, clay, silty clay loam	MH, ML	A-7	0	0	100	100	95-100	85-95	45-55	10-20
	43-60	Silty clay, clay, silty clay loam	MH, ML	A-7	0	0	100	100	95-100	85-95	45-75	10-30
167:												
Prather---------	0-13	Silty clay loam	CL, ML	A-6, A-7	0	0	100	100	95-100	85-95	35-45	10-20
	13-43	Silty clay, clay, silty clay loam	MH, ML	A-7	0	0	100	100	95-100	85-95	45-55	10-20
	43-60	Silty clay, clay, silty clay loam	MH, ML	A-7	0	0	100	100	95-100	85-95	45-75	10-30
168:												
Raught----------	0-11	Silt loam	ML, MH, OH, OL	A-5, A-7	0	0	85-100	75-95	65-90	60-85	40-60	5-20
	11-60	Silt loam, silty clay loam	MH, ML	A-5, A-7	0	0	80-100	75-90	60-80	55-75	40-60	5-20
169:												
Raught----------	0-11	Silt loam	ML, MH, OH, OL	A-5, A-7	0	0	85-100	75-95	65-90	60-85	40-60	5-20
	11-60	Silt loam, silty clay loam	MH, ML	A-5, A-7	0	0	80-100	75-90	60-80	55-75	40-60	5-20
170:												
Raught----------	0-11	Silt loam	ML, MH, OH, OL	A-5, A-7	0	0	85-100	75-95	65-90	60-85	40-60	5-20
	11-60	Silt loam, silty clay loam	MH, ML	A-5, A-7	0	0	80-100	75-90	60-80	55-75	40-60	5-20
171:												
Reichel---------	0-19	Silt loam	ML, MH, OH, OL	A-5, A-7	0	0	95-100	85-100	80-95	75-90	40-60	5-20
	19-47	Gravelly clay loam, gravelly loam, silty clay loam	MH, SM, ML	A-7	0	0-10	80-95	60-90	55-85	40-65	40-60	10-25
	47-53	Very cobbly loam, very gravelly loam, very gravelly clay loam	GM	A-2, A-5, A-7	0	10-45	50-60	40-55	35-50	25-45	40-60	5-20
	53-57	Unweathered bedrock			0	0	---	---	---	---	---	---
172:												
Riverwash-------	0-6	Gravelly sand	GP-GM, GW, GP, GW-GM	A-1	0-5	0-5	50-80	50-75	15-45	0-10	0-14	NP
	6-60	Stratified extremely gravelly coarse sand to gravelly sand	GW, GP, SP, SW	A-1	0-5	0-25	25-65	20-60	10-30	0-5	0-14	NP

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
173:												
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
Rubble land-----	0-60	Fragmental material	GP	A-1	40-50	40-50	0-10	0-5	0-5	0	0-14	NP
174:												
Rose Valley-----	0-11	Silt loam	CL-ML	A-4	0	0	100	100	90-100	80-95	25-30	5-10
	11-51	Silty clay loam, silt loam	CL	A-6	0	0	100	100	90-100	80-95	30-40	10-15
	51-75	Silty clay, silty clay loam, clay	CH, CL	A-7	0	0	100	100	90-100	80-95	45-80	20-55
175:												
Rose Valley-----	0-11	Silt loam	CL-ML	A-4	0	0	100	100	90-100	80-95	25-30	5-10
	11-51	Silty clay loam, silt loam	CL	A-6	0	0	100	100	90-100	80-95	30-40	10-15
	51-75	Silty clay, silty clay loam, clay	CH, CL	A-7	0	0	100	100	90-100	80-95	45-80	20-55
176:												
Salkum----------	0-12	Silt loam	CL	A-6	0	0	95-100	95-100	85-100	65-90	30-40	10-15
	12-45	Silty clay, clay, silty clay loam	MH	A-7	0	0	100	85-100	80-95	65-90	50-65	15-25
	45-60	Silty clay, silty clay loam, clay	MH, ML	A-7	0	0	100	90-100	80-95	65-90	45-60	15-25
177:												
Salkum----------	0-12	Silt loam	CL	A-6	0	0	95-100	95-100	85-100	65-90	30-40	10-15
	12-45	Silty clay, clay, silty clay loam	MH	A-7	0	0	100	85-100	80-95	65-90	50-65	15-25
	45-60	Silty clay, silty clay loam, clay	MH, ML	A-7	0	0	100	90-100	80-95	65-90	45-60	15-25
178:												
Salkum----------	0-12	Silt loam	CL	A-6	0	0	95-100	95-100	85-100	65-90	30-40	10-15
	12-45	Silty clay, clay, silty clay loam	MH	A-7	0	0	100	85-100	80-95	65-90	50-65	15-25
	45-60	Silty clay, silty clay loam, clay	MH, ML	A-7	0	0	100	90-100	80-95	65-90	45-60	15-25
179:												
Sara------------	0-11	Silt loam	CL-ML	A-4	0	0	100	90-100	90-100	80-90	20-30	5-10
	11-35	Silty clay loam	CL	A-6, A-7	0	0	100	90-100	90-100	85-95	30-45	10-20
	35-60	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	90-100	90-100	85-95	45-55	20-30

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
180:												
Sara------------	0-11	Silt loam	CL-ML	A-4	0	0	100	90-100	90-100	80-90	20-30	5-10
	11-35	Silty clay loam	CL	A-6, A-7	0	0	100	90-100	90-100	85-95	30-45	10-20
	35-60	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	90-100	90-100	85-95	45-55	20-30
181:												
Sara------------	0-11	Silt loam	CL-ML	A-4	0	0	100	90-100	90-100	80-90	20-30	5-10
	11-35	Silty clay loam	CL	A-6, A-7	0	0	100	90-100	90-100	85-95	30-45	10-20
	35-60	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	90-100	90-100	85-95	45-55	20-30
182:												
Sara------------	0-11	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	85-95	30-45	10-20
	11-35	Silty clay loam	CL	A-6, A-7	0	0	100	90-100	90-100	85-95	30-45	10-20
	35-60	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	90-100	90-100	85-95	45-55	20-30
183:												
Sarazan---------	0-9	Very gravelly silt loam	GM, SM	A-2, A-4	0	0-15	50-75	35-50	35-50	30-45	30-40	NP-10
	9-31	Very gravelly silt loam, very gravelly silty clay loam	GM	A-2, A-1, A-4, A-5	0	5-15	35-60	30-55	25-50	20-45	35-45	NP-10
	31-50	Extremely gravelly silt loam, extremely cobbly silty clay loam	GM	A-1, A-2	0	10-45	30-50	20-40	15-40	10-35	35-45	NP-10
	50-60	Weathered bedrock			0	0	---	---	---	---	---	---
184:												
Sarazan---------	0-9	Very gravelly silt loam	GM, SM	A-2, A-4	0	0-15	50-75	35-50	35-50	30-45	30-40	NP-10
	9-31	Very gravelly silt loam, very gravelly silty clay loam	GM	A-1, A-5, A-2, A-4	0	5-15	35-60	30-55	25-50	20-45	35-45	NP-10
	31-50	Extremely gravelly silt loam, extremely cobbly silty clay loam	GM	A-1, A-2	0	10-45	30-50	20-40	15-40	10-35	35-45	NP-10
	50-60	Weathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
185:												
Sauvola---------	0-15	Loam	ML	A-4	0	0	90-100	85-100	80-90	70-85	30-40	5-10
	15-27	Loam, silty clay loam, silt loam	MH, ML	A-5, A-4, A-6, A-7	0	0	90-100	85-100	80-90	75-90	30-70	5-30
	27-51	Silty clay loam, silty clay, clay	CL, ML, MH	A-6, A-7	0	0	90-100	85-100	80-100	80-95	35-70	10-40
	51-60	Silty clay loam, silty clay, clay	CH, CL	A-7	0	0	90-100	85-100	80-100	80-95	40-70	15-40
186:												
Sauvola---------	0-15	Loam	ML	A-4	0	0	90-100	85-100	80-90	70-85	30-40	5-10
	15-27	Loam, silty clay loam, silt loam	MH, ML	A-4, A-7, A-5, A-6	0	0	90-100	85-100	80-90	75-90	30-70	5-30
	27-51	Silty clay loam, silty clay, clay	MH, CL, ML	A-6, A-7	0	0	90-100	85-100	80-100	80-95	35-70	10-40
	51-60	Silty clay loam, silty clay, clay	CH, CL	A-7	0	0	90-100	85-100	80-100	80-95	40-70	15-40
187:												
Sauvola---------	0-15	Loam	ML	A-4	0	0	90-100	85-100	80-90	70-85	30-40	5-10
	15-27	Loam, silty clay loam, silt loam	MH, ML	A-4, A-7, A-5, A-6	0	0	90-100	85-100	80-90	75-90	30-70	5-30
	27-51	Silty clay loam, silty clay, clay	CL, ML, MH	A-6, A-7	0	0	90-100	85-100	80-100	80-95	35-70	10-40
	51-60	Silty clay loam, silty clay, clay	CH, CL	A-7	0	0	90-100	85-100	80-100	80-95	40-70	15-40
188:												
Schneider-------	0-12	Very gravelly loam	GM	A-1, A-2	0	0-20	30-60	30-50	20-40	15-30	40-60	5-20
	12-28	Extremely gravelly loam, very gravelly silt loam, very cobbly silt loam	GM	A-1, A-2	0	0-40	30-55	20-50	20-40	15-30	35-55	5-15
	28-45	Extremely gravelly loam, extremely gravelly silt loam, extremely cobbly silt loam	GM	A-1, A-2	0	35-45	30-50	20-35	20-35	15-30	35-55	5-15
	45-49	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
189:												
Schneider-------	0-12	Very gravelly loam	GM	A-1, A-2	0	0-20	30-60	30-50	20-40	15-30	40-60	5-20
	12-28	Extremely gravelly loam, very gravelly silt loam, very cobbly silt loam	GM	A-1, A-2	0	0-40	30-55	25-50	20-40	15-30	35-55	5-15
	28-45	Extremely gravelly loam, extremely gravelly silt loam, extremely cobbly silt loam	GM	A-1, A-2	0	35-45	30-50	20-35	20-35	15-30	35-55	5-15
	45-49	Unweathered bedrock			0	0	---	---	---	---	---	---
190:												
Schneider-------	0-12	Very gravelly loam	GM	A-1, A-2	0	0-20	30-60	30-50	20-40	15-30	40-60	5-20
	12-28	Extremely gravelly loam, very gravelly silt loam, very cobbly silt loam	GM	A-1, A-2	0	0-40	30-55	25-50	20-40	15-30	35-55	5-15
	28-45	Extremely gravelly loam, extremely gravelly silt loam, extremely cobbly silt loam	GM	A-1, A-2	0	35-45	30-50	20-35	20-35	15-30	35-55	5-15
	45-49	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
191:												
Schneider-------	0-12	Very gravelly loam	GM	A-1, A-2	0	0-20	30-60	30-50	20-40	15-30	40-60	5-20
	12-28	Extremely gravelly loam, very gravelly silt loam, very cobbly silt loam	GM	A-1, A-2	0	0-40	30-55	25-50	20-40	15-30	35-55	5-15
	28-45	Extremely gravelly loam, extremely gravelly silt loam, extremely cobbly silt loam	GM	A-1, A-2	0	35-45	30-50	20-35	20-35	15-30	35-55	5-15
	45-49	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
191:												
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
192:												
Seaquest--------	0-6	Silt loam	CL	A-6	0	0	95-100	90-100	80-90	70-80	30-40	10-20
	6-60	Silty clay loam, clay, clay loam	CL	A-6, A-7	0	0	95-100	90-100	80-90	70-85	30-45	15-25
193:												
Seaquest--------	0-6	Silt loam	CL	A-6	0	0	95-100	90-100	80-90	70-80	30-40	10-20
	6-60	Silty clay loam, clay, clay loam	CL	A-6, A-7	0	0	95-100	90-100	80-90	70-85	30-45	15-25
194:												
Seaquest--------	0-6	Silt loam	CL	A-6	0	0	95-100	90-100	80-90	70-80	30-40	10-20
	6-60	Silty clay loam, clay, clay loam	CL	A-6, A-7	0	0	95-100	90-100	80-90	70-85	30-45	15-25
195:												
Semiahmoo-------	0-15	Muck	PT	A-8	0	0	---	---	---	---	---	NP
	15-46	Muck	PT	A-8	0	0	---	---	---	---	---	NP
	46-60	Silty clay, silty clay loam, gravelly sandy loam	CL, ML, SM, SC	A-2, A-7, A-4, A-5	0	0	70-100	60-100	50-90	30-85	15-50	NP-25
196:												
Siouxon---------	0-14	Very cobbly silt loam	GM, SM	A-2, A-4	0	30-45	65-75	45-70	40-65	30-50	25-40	NP-10
	14-28	Very cobbly loam, very cobbly silt loam, extremely cobbly loam	SM	A-1, A-2, A-4	0-2	30-70	60-75	30-70	25-65	20-45	25-40	NP-10
	28-55	Extremely cobbly loam, extremely cobbly silt loam	GM	A-1, A-2	0-2	60-75	35-60	15-55	10-50	10-35	25-40	NP-10
	55-59	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
197:												
Siouxon---------	0-14	Very cobbly silt loam	GM, SM	A-2, A-4	0	30-45	65-75	45-70	40-65	30-50	25-40	NP-10
	14-28	Very cobbly loam, very cobbly silt loam, extremely cobbly loam	SM	A-2, A-1, A-4	0-2	30-70	60-75	30-70	25-65	20-45	25-40	NP-10
	28-55	Extremely cobbly loam, extremely cobbly silt loam	GM	A-1, A-2	0-2	60-75	35-60	15-55	10-50	10-35	25-40	NP-10
	55-59	Unweathered bedrock			0	0	---	---	---	---	---	---
198:												
Siouxon---------	0-14	Very cobbly silt loam	GM, SM	A-2, A-4	0	30-45	65-75	45-70	40-65	30-50	25-40	NP-10
	14-28	Very cobbly loam, very cobbly silt loam, extremely cobbly loam	SM	A-1, A-2, A-4	0-2	30-70	60-75	30-70	25-65	20-45	25-40	NP-10
	28-55	Extremely cobbly loam, extremely cobbly silt loam	GM	A-1, A-2	0-2	60-75	35-60	15-55	10-50	10-35	25-40	NP-10
	55-59	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
199:												
Snohomish-------	0-7	Silty clay loam	ML, OL	A-7	0	0	100	100	95-100	90-100	40-50	10-20
	7-18	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	90-100	30-50	10-30
	18-60	Muck, mucky peat	PT	A-8	0	0	---	---	---	---	0-14	NP
200:												
Solo------------	0-2	Gravelly loamy sand	SM	A-1	0	0	80-90	65-75	40-50	15-25	0-14	NP
	2-20	Gravelly loamy sand	SM	A-1	0	0	80-90	65-75	40-50	15-20	0-14	NP
	20-32	Gravelly sand	SP	A-1	0	0	70-90	50-75	15-25	0-5	0-14	NP
	32-60	Cemented			0	0	---	---	---	---	---	---
201:												
Speelyai--------	0-5	Gravelly loamy sand	SM	A-1	0	0	80-90	65-75	40-50	15-25	0-14	NP
	5-11	Gravelly sand	SP	A-1	0	0	70-90	50-70	30-40	0-5	0-14	NP
	11-60	Cemented			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*	*Pct*					*Pct*	
202:												
Speelyai--------	0-5	Gravelly loamy sand	SM	A-1	0	0	80-90	65-75	40-50	15-25	0-14	NP
	5-11	Gravelly sand	SP	A-1	0	0	70-90	50-70	30-40	0-5	0-14	NP
	11-60	Cemented			0	0	---	---	---	---	---	---
203:												
Spodic Cryopsamments--	0-12	Loamy sand	SM	A-1, A-2	0	0	90-100	75-100	40-65	10-25	0-14	NP
	12-55	Sand	SM, SP-SM	A-1, A-2, A-3	0	0	90-100	75-100	40-60	5-15	0-14	NP
	55-60	Stratified loamy fine sand to sandy loam	SM	A-2	0	0	95-100	90-100	55-80	15-35	0-14	NP
204:												
Stahl-----------	0-7	Very gravelly silt loam	GM, SM	A-2	0	0	50-70	30-50	25-45	20-35	40-60	5-20
	7-11	Extremely gravelly silt loam, very gravelly silty clay loam, very gravelly silt loam	GM	A-2	0	10-25	40-60	15-40	15-40	10-35	40-60	5-20
	11-36	Extremely cobbly silty clay loam, extremely cobbly silt loam, extremely gravelly silt loam	GM	A-2	0	30-55	40-60	15-35	15-30	10-30	40-60	5-20
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---
205:												
Stahl-----------	0-7	Very gravelly silt loam	GM, SM	A-2	0	0	50-70	30-50	25-45	20-35	40-60	5-20
	7-11	Extremely gravelly silt loam, very gravelly silty clay loam, very gravelly silt loam	GM	A-2	0	10-25	40-60	15-40	15-40	10-35	40-60	5-20
	11-36	Extremely cobbly silty clay loam, extremely cobbly silt loam, extremely gravelly silt loam	GM	A-2	0	30-55	40-60	15-35	15-30	10-30	40-60	5-20
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
205:												
Reichel---------	0-19	Silt loam	MH, OL, ML, OH	A-5, A-7	0	0	95-100	85-100	80-95	75-90	40-60	5-20
	19-47	Gravelly clay loam, gravelly loam, silty clay loam	ML, MH, SM	A-7	0	0-10	80-95	60-90	55-85	40-65	40-60	10-25
	47-53	Very cobbly loam, very gravelly loam, very gravelly clay loam	GM	A-2, A-7, A-5	0	10-45	50-60	40-55	35-50	25-45	40-60	5-20
	53-57	Unweathered bedrock			0	0	---	---	---	---	---	---
206:												
Stahl-----------	0-7	Very gravelly silt loam	GM, SM	A-2	0	0	50-70	30-50	25-45	20-35	40-60	5-20
	7-11	Extremely gravelly silt loam, very gravelly silty clay loam, very gravelly silt loam	GM	A-2	0	10-25	40-60	15-40	15-40	10-35	40-60	5-20
	11-36	Extremely cobbly silty clay loam, extremely cobbly silt loam, extremely gravelly silt loam	GM	A-2	0	30-55	40-60	15-35	15-30	10-30	40-60	5-20
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---
Reichel---------	0-19	Silt loam	ML, MH, OH, OL	A-5, A-7	0	0	95-100	85-100	80-95	75-90	40-60	5-20
	19-47	Gravelly clay loam, gravelly loam, silty clay loam	ML, MH, SM	A-7	0	0-10	80-95	60-90	55-85	40-65	40-60	10-25
	47-53	Very cobbly loam, very gravelly loam, very gravelly clay loam	GM	A-2, A-5, A-7	0	10-45	50-60	40-55	35-50	25-45	40-60	5-20
	53-57	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
207:												
Stahl	0-7	Very gravelly silt loam	GM, SM	A-2	0	0	50-70	30-50	25-45	20-35	40-60	5-20
	7-11	Extremely gravelly silt loam, very gravelly silty clay loam, very gravelly silt loam	GM	A-2	0	10-25	40-60	15-40	15-40	10-35	40-60	5-20
	11-36	Extremely cobbly silty clay loam, extremely cobbly silt loam, extremely gravelly silt loam	GM	A-2	0	30-55	40-60	15-35	15-30	10-30	40-60	5-20
	36-40	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
208:												
Stella	0-11	Silt loam	CL	A-6	0	0	100	100	90-100	75-95	25-35	10-20
	11-25	Silt loam	CL	A-6	0	0	100	100	95-100	90-100	25-35	10-20
	25-48	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	90-100	85-95	35-45	15-20
	48-60	Silty clay, silty clay loam	CH, CL	A-7	0	0	100	100	95-100	90-100	45-75	20-45
209:												
Stella	0-11	Silt loam	CL	A-6	0	0	100	100	90-100	75-95	25-35	10-20
	11-25	Silt loam	CL	A-6	0	0	100	100	95-100	90-100	25-35	10-20
	25-48	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	90-100	85-95	35-45	15-20
	48-60	Silty clay, silty clay loam	CH, CL	A-7	0	0	100	100	95-100	90-100	45-75	20-45
210:												
Stella	0-11	Silt loam	CL	A-6	0	0	100	100	90-100	75-95	25-35	10-20
	11-25	Silt loam	CL	A-6	0	0	100	100	95-100	90-100	25-35	10-20
	25-48	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	90-100	85-95	35-45	15-20
	48-60	Silty clay, silty clay loam	CH, CL	A-7	0	0	100	100	95-100	90-100	45-75	20-45

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
211:												
Studebaker------	0-8	Very gravelly loamy sand	GM, SM	A-1	0-5	5-25	50-65	40-55	10-25	10-15	0-14	NP
	8-60	Very gravelly loamy sand, extremely gravelly loamy sand, extremely cobbly sand	GP, GP-GM	A-1	0-10	15-50	20-50	20-50	10-20	0-10	0-14	NP
212:												
Swem-----------	0-12	Cobbly silt loam	MH, ML	A-5, A-7	0-5	25-40	75-90	75-85	65-75	55-60	45-65	5-20
	12-32	Gravelly silt loam, cobbly loam	MH, GM, ML, SM	A-5, A-7	0	0-20	65-75	50-75	45-70	35-55	40-60	5-20
	32-60	Silt loam, loam, clay loam	MH, ML	A-5, A-7	0	0-5	95-100	95-100	85-95	65-85	40-60	5-20
213:												
Swem-----------	0-12	Cobbly silt loam	MH, ML	A-5, A-7	0-5	25-40	75-90	75-85	65-75	55-60	45-65	5-20
	12-32	Gravelly silt loam, cobbly loam	MH, ML, GM, SM	A-5, A-7	0	0-20	65-75	50-75	45-70	35-55	40-60	5-20
	32-60	Silt loam, clay loam, silty clay loam	MH, ML	A-5, A-7	0	0-5	95-100	95-100	85-95	65-85	40-60	5-20
214:												
Swift----------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	80-90	50-75	15-25	---	NP
	5-9	Sandy loam	SM	A-2, A-4	0	0	90-100	75-95	55-70	25-40	15-25	NP-5
	9-17	Gravelly sandy loam, gravelly silt loam	SM	A-2, A-1, A-4	0	0	70-85	50-75	35-55	20-40	15-25	NP-5
	17-29	Very gravelly loam, very gravelly sandy loam	SM	A-1, A-2	0	0	70-90	35-50	25-45	10-35	---	NP
	29-60	Very gravelly loam, very gravelly clay loam, extremely cobbly loam	GM, SM	A-1, A-4, A-2	0-5	30-50	35-70	25-60	20-50	15-45	30-40	NP-5

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
215:												
Swift	0-5	Loamy sand	SM	A-2	0	0-5	90-100	80-90	50-75	15-25	---	NP
	5-9	Sandy loam	SM	A-2, A-4	0	0	90-100	75-95	55-70	25-40	15-25	NP-5
	9-17	Gravelly sandy loam, gravelly silt loam	SM	A-1, A-4, A-2	0	0	70-85	50-75	35-55	20-40	15-25	NP-5
	17-29	Very gravelly loam, very gravelly sandy loam	SM	A-1, A-2	0	0	70-90	35-50	25-45	10-35	---	NP
	29-60	Very gravelly loam, very gravelly clay loam, extremely cobbly loam	GM, SM	A-1, A-2, A-4	0-5	30-50	35-70	25-60	20-50	15-45	30-40	NP-5
216:												
Swift	0-4	Sandy loam	SM	A-2, A-4	0	0	95-100	75-95	50-70	25-40	---	NP
	4-24	Gravelly sandy loam, gravelly silt loam	SM	A-1, A-2, A-4	0	0	70-85	50-75	35-55	20-40	15-25	NP-5
	24-60	Very gravelly loam, very gravelly clay loam, extremely cobbly loam	GM, SM	A-2, A-1, A-4	0-5	30-50	35-70	25-60	20-50	15-45	30-40	NP-5
217:												
Swift	0-4	Sandy loam	SM	A-2, A-4	0	0	95-100	75-95	50-70	25-40	---	NP
	4-24	Gravelly sandy loam, gravelly silt loam	SM	A-1, A-4, A-2	0	0	70-85	50-75	35-55	20-40	15-25	NP-5
	24-60	Very gravelly loam, very gravelly clay loam, extremely cobbly loam	GM, SM	A-2, A-1, A-4	0-5	30-50	35-70	25-60	20-50	15-45	30-40	NP-5
218:												
Swift	0-4	Sandy loam	SM	A-2, A-4	0	0	95-100	75-95	50-70	25-40	---	NP
	4-24	Gravelly sandy loam, gravelly silt loam	SM	A-1, A-4, A-2	0	0	70-85	50-75	35-55	20-40	15-25	NP-5
	24-60	Very gravelly loam, very gravelly clay loam, extremely cobbly loam	GM, SM	A-1, A-4, A-2	0-5	30-50	35-70	25-60	20-50	15-45	30-40	NP-5

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
219:												
Swift-----------	0-4	Sandy loam	SM	A-2, A-4	0	0	95-100	75-95	50-70	25-40	---	NP
	4-24	Gravelly sandy loam, gravelly silt loam	SM	A-2, A-1, A-4	0	0	70-85	50-75	35-55	20-40	15-25	NP-5
	24-60	Very gravelly loam, very gravelly clay loam, extremely cobbly loam	GM, SM	A-2, A-1, A-4	0-5	30-50	35-70	25-60	20-50	15-45	30-40	NP-5
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
220:												
Swift-----------	0-4	Sandy loam	SM	A-2, A-4	0	0	95-100	75-95	50-70	25-40	---	NP
	4-24	Gravelly sandy loam, gravelly silt loam	SM	A-1, A-4, A-2	0	0	70-85	50-75	35-55	20-40	15-25	NP-5
	24-60	Very gravelly loam, very gravelly clay loam, extremely cobbly loam	GM, SM	A-1, A-2, A-4	0-5	30-50	35-70	25-60	20-50	15-45	30-40	NP-5
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
221:												
Swift-----------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	80-90	50-75	15-25	---	NP
	5-9	Sandy loam	SM	A-2, A-4	0	0	90-100	75-95	55-70	25-40	15-25	NP-5
	9-17	Gravelly sandy loam, gravelly silt loam	SM	A-1, A-4, A-2	0	0	70-85	50-75	35-55	20-40	15-25	NP-5
	17-29	Very gravelly loam, very gravelly sandy loam	SM	A-1, A-2	0	0	70-90	35-50	25-45	10-35	---	NP
	29-60	Very gravelly loam, very gravelly clay loam, extremely cobbly loam	GM, SM	A-2, A-1, A-4	0-5	30-50	35-70	25-60	20-50	15-45	30-40	NP-5
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
222:												
Vader-----------	0-6	Loam	ML	A-4	0	0	100	95-100	85-95	60-75	20-30	NP-5
	6-40	Loam, fine sandy loam, sandy loam	ML, SM	A-4	0	0	100	95-100	70-95	40-75	20-30	NP-5
	40-60	Fine sandy loam, sandy loam, loamy sand	ML, SM	A-2, A-4	0	0	100	95-100	50-85	20-55	15-25	NP-5

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*	*Pct*					*Pct*	
223:												
Vader-----------	0-6	Loam	ML	A-4	0	0	100	95-100	85-95	60-75	20-30	NP-5
	6-40	Loam, fine sandy loam, sandy loam	ML, SM	A-4	0	0	100	95-100	70-95	40-75	20-30	NP-5
	40-60	Fine sandy loam, sandy loam, loamy sand	ML, SM	A-2, A-4	0	0	100	95-100	50-85	20-55	15-25	NP-5
224:												
Vanson----------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	---	NP
	5-25	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-90	40-90	30-50	10-30	30-50	NP
	25-56	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	56-60	Unweathered bedrock			0	0	---	---	---	---	---	---
225:												
Vanson----------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	---	NP
	5-25	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-90	40-90	30-50	10-30	30-50	NP
	25-56	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	56-60	Unweathered bedrock			0	0	---	---	---	---	---	---
226:												
Vanson----------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	---	NP
	5-25	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-90	40-90	30-50	10-30	30-50	NP
	25-56	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	56-60	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
227:												
Vanson----------	0-6	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	0-14	NP
	6-17	Cobbly sandy loam, gravelly sandy loam	SM	A-4	0	15-25	90-100	80-90	60-70	35-45	15-20	NP-5
	17-42	Very gravelly sandy loam, extremely gravelly sandy loam	GM	A-1	0	25-30	30-50	20-40	15-30	10-25	15-20	NP-5
	42-60	Extremely gravelly loamy sand	GM	A-1, A-2	0-15	20-30	30-50	20-40	5-30	0-25	---	NP
228:												
Vanson----------	0-6	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	0-14	NP
	6-17	Cobbly sandy loam, gravelly sandy loam	SM	A-4	0	15-25	90-100	80-90	60-70	35-45	15-20	NP-5
	17-42	Very gravelly sandy loam, extremely gravelly sandy loam	GM	A-1	0	25-30	30-50	20-40	15-30	10-25	15-20	NP-5
	42-60	Extremely gravelly loamy sand	GM	A-1, A-2	0-15	20-30	30-50	20-40	5-30	0-25	---	NP
229:												
Vanson----------	0-6	Sandy loam	SM	A-2, A-4	0	0	90-100	75-95	55-70	25-40	30-50	NP
	6-20	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-90	40-90	30-50	10-30	30-50	NP
	20-51	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	51-55	Unweathered bedrock			0	0	---	---	---	---	---	---
230:												
Vanson----------	0-6	Sandy loam	SM	A-2, A-4	0	0	90-100	75-95	55-70	25-40	30-50	NP
	6-20	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-90	40-90	30-50	10-30	30-50	NP
	20-51	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	51-55	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
231:												
Vanson	0-6	Sandy loam	SM	A-2, A-4	0	0	90-100	75-95	55-70	25-40	30-50	NP
	6-20	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-90	40-90	30-50	10-30	30-50	NP
	20-51	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	51-55	Unweathered bedrock			0	0	---	---	---	---	---	---
232:												
Vanson	0-6	Sandy loam	SM	A-2, A-4	0	0	90-100	75-95	55-70	25-40	15-20	NP
	6-20	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-100	40-90	30-50	10-30	25-35	NP
	20-51	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0-10	10-55	30-60	20-50	15-40	10-35	30-50	NP-10
	51-61	Weathered bedrock			0	0	---	---	---	---	---	---
233:												
Vanson	0-6	Sandy loam	SM	A-2, A-4	0	0	90-100	75-95	55-70	25-40	15-20	NP
	6-20	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-100	40-90	30-50	10-30	25-35	NP
	20-51	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0-10	10-55	30-60	20-50	15-40	10-35	30-50	NP-10
	51-61	Weathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				*Pct*	*Pct*					*Pct*	
234:												
Vanson----------	0-7	Cobbly sandy loam	SM	A-4	0	15-25	90-100	80-90	60-70	35-45	15-20	NP-5
	7-22	Gravelly sandy loam, cobbly sandy loam	SM	A-1, A-2	0	5-25	75-90	70-80	40-50	20-30	25-35	NP-5
	22-42	Very gravelly sandy loam, extremely gravelly sandy loam	GM	A-1	0	25-30	30-50	20-40	15-30	10-25	15-20	NP-5
	42-60	Extremely gravelly loamy sand	GM	A-1, A-2	0-15	20-30	30-50	20-40	5-30	0-25	---	NP
235:												
Vanson----------	0-7	Cobbly sandy loam	SM	A-4	0	15-25	90-100	80-90	60-70	35-45	15-20	NP-5
	7-22	Gravelly sandy loam, cobbly sandy loam	SM	A-1, A-2	0	5-25	75-90	70-80	40-50	20-30	25-35	NP-5
	22-42	Very gravelly sandy loam, extremely gravelly sandy loam	GM	A-1	0	25-30	30-50	20-40	15-30	10-25	15-20	NP-5
	42-60	Extremely gravelly loamy sand	GM	A-1, A-2	0-15	20-30	30-50	20-40	5-30	0-25	---	NP
236:												
Vanson----------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	---	NP
	5-25	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-90	40-90	30-50	10-30	30-50	NP
	25-56	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	56-60	Unweathered bedrock			0	0	---	---	---	---	---	---
Hatchet---------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	---	NP
	5-23	Extremely cobbly loam, very cobbly loam	GM, SM	A-1, A-2	10-30	25-60	50-70	30-50	25-45	20-35	30-40	NP-5
	23-38	Extremely cobbly clay loam, extremely cobbly sandy loam, extremely cobbly loam	GM, GP-GM	A-1	25-35	55-60	35-50	15-35	10-25	5-20	30-40	NP-5
	38-42	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				*Pct*	*Pct*					*Pct*	
237:												
Vanson----------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	---	NP
	5-25	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-90	40-90	30-50	10-30	30-50	NP
	25-56	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	56-60	Unweathered bedrock			0	0	---	---	---	---	---	---
Hatchet---------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	---	NP
	5-23	Extremely cobbly loam, very cobbly loam	GM, SM	A-1, A-2	10-30	25-60	50-70	30-50	25-45	20-35	30-40	NP-5
	23-38	Extremely cobbly clay loam, extremely cobbly sandy loam, extremely cobbly loam	GM, GP-GM	A-1	25-35	55-60	35-50	15-35	10-25	5-20	30-40	NP-5
	38-42	Unweathered bedrock			0	0	---	---	---	---	---	---
238:												
Vanson----------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	---	NP
	5-25	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-90	40-90	30-50	10-30	30-50	NP
	25-56	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	56-60	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
238:												
Hatchet---------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	---	NP
	5-23	Extremely cobbly loam, very cobbly loam	GM, SM	A-1, A-2	10-30	25-60	50-70	30-50	25-45	20-35	30-40	NP-5
	23-38	Extremely cobbly clay loam, extremely cobbly sandy loam, extremely cobbly loam	GM, GP-GM	A-1	25-35	55-60	35-50	15-35	10-25	5-20	30-40	NP-5
	38-42	Unweathered bedrock			0	0	---	---	---	---	---	---
239:												
Vanson----------	0-6	Sandy loam	SM	A-2, A-4	0	0	90-100	75-95	55-70	25-40	30-50	NP
	6-20	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-90	40-90	30-50	10-30	30-50	NP
	20-51	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	51-55	Unweathered bedrock			0	0	---	---	---	---	---	---
Hatchet---------	0-18	Very cobbly sandy loam	GM, SM	A-1, A-2	0-1	20-40	45-70	45-65	30-45	15-25	25-45	NP-10
	18-33	Extremely cobbly sandy loam, extremely cobbly loam, extremely cobbly clay loam	GM, GP-GM, GP	A-1, A-2	0-5	55-60	30-50	10-20	5-15	0-15	25-45	NP-10
	33-37	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
240:												
Vanson----------	0-6	Sandy loam	SM	A-2, A-4	0	0	90-100	75-95	55-70	25-40	30-50	NP
	6-20	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-90	40-90	30-50	10-30	30-50	NP
	20-51	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	51-55	Unweathered bedrock			0	0	---	---	---	---	---	---
Hatchet---------	0-18	Very cobbly sandy loam	GM, SM	A-1, A-2	0-1	20-40	45-70	45-65	30-45	15-25	25-45	NP-10
	18-33	Extremely cobbly sandy loam, extremely cobbly loam, extremely cobbly clay loam	GP, GM, GP-GM	A-1, A-2	0-5	55-60	30-50	10-20	5-15	0-15	25-45	NP-10
	33-37	Unweathered bedrock			0	0	---	---	---	---	---	---
241:												
Vanson----------	0-6	Sandy loam	SM	A-2, A-4	0	0	90-100	75-95	55-70	25-40	30-50	NP
	6-20	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-90	40-90	30-50	10-30	30-50	NP
	20-51	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	51-55	Unweathered bedrock			0	0	---	---	---	---	---	---
Hatchet---------	0-18	Very cobbly sandy loam	GM, SM	A-1, A-2	0-1	20-40	45-70	45-65	30-45	15-25	25-45	NP-10
	18-33	Extremely cobbly sandy loam, extremely cobbly loam, extremely cobbly clay loam	GM, GP-GM, GP	A-1, A-2	0-5	55-60	30-50	10-20	5-15	0-15	25-45	NP-10
	33-37	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
242:												
Vanson----------	0-6	Sandy loam	SM	A-2, A-4	0	0	90-100	75-95	55-70	25-40	30-50	NP
	6-20	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-90	40-90	30-50	10-30	30-50	NP
	20-51	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	51-55	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
243:												
Vanson----------	0-6	Sandy loam	SM	A-2, A-4	0	0	90-100	75-95	55-70	25-40	30-50	NP
	6-20	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-90	40-90	30-50	10-30	30-50	NP
	20-51	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	51-55	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
244:												
Vanson----------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	---	NP
	5-25	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-90	40-90	30-50	10-30	30-50	NP
	25-56	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	56-60	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*	*Pct*					*Pct*	
245:												
Vanson----------	0-5	Loamy sand	SM	A-2	0	0-5	90-100	90-100	50-75	20-30	---	NP
	5-25	Very gravelly loamy sand, sandy loam, gravelly loamy sand	SM	A-1, A-2	0	0	75-90	40-90	30-50	10-30	30-50	NP
	25-56	Very gravelly loam, very gravelly sandy loam, extremely cobbly sandy loam	GM	A-1, A-2	0	20-55	30-60	20-50	15-40	10-35	30-50	NP-10
	56-60	Unweathered bedrock			0	0	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
246:												
Voight----------	0-10	Silt loam	CL-ML, ML	A-4	0	0-5	90-100	75-100	70-100	55-90	25-35	5-10
	10-37	Gravelly silty clay loam, silty clay loam, clay loam	CL, MH, SM, SC	A-7	0	0-10	70-95	60-90	50-85	40-80	40-60	15-25
	37-60	Gravelly loam, silty clay loam, gravelly silt loam	CL, GC, SC	A-6, A-7	0	0-10	70-95	60-90	50-85	40-80	30-45	10-20
247:												
Winston---------	0-4	Silt loam	MH, ML	A-4, A-5, A-7	0	0	95-100	85-95	75-85	55-80	35-60	NP-20
	4-24	Loam, gravelly loam, gravelly fine sandy loam	MH, GM, ML, SM	A-4, A-2, A-5, A-7	0	0-5	60-95	55-90	40-80	25-60	30-60	NP-20
	24-60	Very gravelly loamy sand, extremely gravelly sand	GM, SM, MH, ML	A-2, A-7, A-4, A-5	0	5-25	30-60	20-50	40-80	25-60	30-60	NP-20
248:												
Wyant-----------	0-4	Loam	CL-ML, ML	A-4	0	0-5	90-100	85-100	75-90	55-70	20-30	NP-10
	4-12	Silty clay loam, clay loam	MH, ML	A-7	0	0-5	100	100	95-100	85-95	45-65	15-30
	12-26	Silty clay, clay, clay loam	CH	A-7	0	0-5	95-100	90-100	80-100	65-90	50-70	25-45
	26-39	Clay loam, sandy clay loam	MH, ML	A-7	0	0-5	95-100	90-100	80-100	50-80	45-65	15-30
	39-49	Weathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
249:												
Wyant-----------	0-4	Loam	CL-ML, ML	A-4	0	0-5	90-100	85-100	75-90	55-70	20-30	NP-10
	4-12	Silty clay loam, clay loam	MH, ML	A-7	0	0-5	100	100	95-100	85-95	45-65	15-30
	12-26	Silty clay, clay, clay loam	CH	A-7	0	0-5	95-100	90-100	80-100	65-90	50-70	25-45
	26-39	Clay loam, sandy clay loam	MH, ML	A-7	0	0-5	95-100	90-100	80-100	50-80	45-65	15-30
	39-49	Weathered bedrock			0	0	---	---	---	---	---	---
250:												
Xana------------	0-8	Loamy sand	SM	A-1, A-2	0	0	90-100	75-90	40-65	15-25	15-25	NP
	8-20	Loamy sand, gravelly loamy sand	SM	A-1, A-2	0	0	90-100	55-90	30-65	10-25	15-25	NP
	20-32	Very gravelly sandy loam, very gravelly loamy sand	SM, SP-SM	A-1	0	0	80-95	30-50	15-35	5-20	15-35	NP
	32-60	Extremely gravelly loamy sand	SP	A-1	0	0	80-95	10-25	5-15	0-5	0-14	NP
251:												
Xana------------	0-8	Loamy sand	SM	A-1, A-2	0	0	90-100	75-90	40-65	15-25	15-25	NP
	8-20	Loamy sand, gravelly loamy sand	SM	A-1, A-2	0	0	90-100	55-90	30-65	10-25	15-25	NP
	20-32	Very gravelly sandy loam, very gravelly loamy sand	SM, SP-SM	A-1	0	0	80-95	30-50	15-35	5-20	15-35	NP
	32-60	Extremely gravelly loamy sand	SP	A-1	0	0	80-95	10-25	5-15	0-5	0-14	NP
252:												
Xeno------------	0-10	Silt loam	ML	A-4	0	0	100	100	90-100	70-90	30-40	NP-10
	10-24	Silt loam, silty clay loam, gravelly silty clay loam	ML	A-4	0	0-10	80-95	65-90	60-85	50-80	30-40	NP-10
	24-54	Silt loam, silty clay loam	ML	A-4	0	0	100	100	90-100	75-95	30-40	NP-10
	54-64	Weathered bedrock			0	0	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
253:												
Xeno------------	0-10	Silt loam	ML	A-4	0	0	100	100	90-100	70-90	30-40	NP-10
	10-24	Silt loam, silty clay loam, gravelly silty clay loam	ML	A-4	0	0-10	80-95	65-90	60-85	50-80	30-40	NP-10
	24-54	Silt loam, silty clay loam	ML	A-4	0	0	100	100	90-100	75-95	30-40	NP-10
	54-64	Weathered bedrock			0	0	---	---	---	---	---	---
254:												
Xerorthents-----	0-4	Gravelly sandy loam	SM	A-1, A-2	0	0-5	65-80	55-75	35-50	15-30	15-20	NP-5
	4-35	Gravelly sandy loam, clay loam, silt loam	CL, ML, SM	A-1, A-2, A-6, A-4	0	0-10	70-90	55-90	45-80	20-60	20-40	NP-15
	35-60	Very gravelly sand, extremely gravelly sand, very cobbly sand	GP, SP	A-1	0	0-35	35-60	20-50	20-30	0-5	0-14	NP
255:												
Yalelake--------	0-12	Sandy loam	SM	A-2, A-4	0	0	95-100	85-100	55-70	30-40	0-14	NP
	12-26	Gravelly loamy sand, gravelly sandy loam	SM	A-1, A-2	0	0-10	70-90	55-75	30-60	15-30	0-14	NP
	26-47	Sandy loam, loam, gravelly sandy loam	ML, SM	A-4	0	0	75-90	60-85	50-80	35-65	30-40	NP-5
	47-60	Stratified sand to gravelly loam	SM	A-4	0	0	75-90	60-85	45-75	35-50	30-40	NP-5
256:												
Yalelake--------	0-12	Sandy loam	SM	A-2, A-4	0	0	95-100	85-100	55-70	30-40	0-14	NP
	12-26	Gravelly loamy sand, gravelly sandy loam	SM	A-1, A-2	0	0-10	70-90	55-75	30-60	15-30	0-14	NP
	26-47	Sandy loam, loam, gravelly sandy loam	ML, SM	A-4	0	0	75-90	60-85	50-80	35-65	30-40	NP-5
	47-60	Stratified sand to gravelly loam	SM	A-4	0	0	75-90	60-85	45-75	35-50	30-40	NP-5
257:												
Yalelake--------	0-12	Sandy loam	SM	A-2, A-4	0	0	95-100	85-100	55-70	30-40	0-14	NP
	12-26	Gravelly loamy sand, gravelly sandy loam	SM	A-1, A-2	0	0-10	70-90	55-75	30-60	15-30	0-14	NP
	26-47	Sandy loam, loam, gravelly sandy loam	ML, SM	A-4	0	0	75-90	60-85	50-80	35-65	30-40	NP-5
	47-60	Stratified sand to gravelly loam	SM	A-4	0	0	75-90	60-85	45-75	35-50	30-40	NP-5

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
258:												
Zenker----------	0-10	Silt loam	ML, MH, OH, OL	A-5, A-7	0	0	100	100	90-100	70-90	45-65	5-20
	10-18	Silt loam, loam	MH, ML	A-5, A-7	0	0	100	100	85-95	65-80	40-60	5-20
	18-41	Loam, silt loam	MH, ML	A-5, A-7	0	0	100	100	85-95	60-75	40-60	5-20
	41-45	Unweathered bedrock			0	0	---	---	---	---	---	---
259:												
Zenker----------	0-10	Silt loam	MH, OL, ML, OH	A-5, A-7	0	0	100	100	90-100	70-90	45-65	5-20
	10-18	Silt loam, loam	MH, ML	A-5, A-7	0	0	100	100	85-95	65-80	40-60	5-20
	18-41	Loam, silt loam	MH, ML	A-5, A-7	0	0	100	100	85-95	60-75	40-60	5-20
	41-45	Unweathered bedrock			0	0	---	---	---	---	---	---
260:												
Zymer-----------	0-10	Sandy loam	SM	A-2	0	0	85-100	80-90	50-60	20-35	15-25	NP-5
	10-20	Gravelly loamy sand, loamy sand, gravelly sandy loam	SM	A-1, A-2	0	0	85-100	50-90	25-60	10-25	0-14	NP
	20-26	Very gravelly loam	GM, SM	A-1, A-2	0	0	45-70	35-50	25-45	20-35	25-35	NP-5
	26-60	Very gravelly loam, extremely gravelly loam, extremely gravelly clay loam	GM	A-1, A-2	0	0-30	25-60	15-45	15-40	15-35	25-40	NP-10
261:												
Zymer-----------	0-10	Sandy loam	SM	A-2	0	0	85-100	80-90	50-60	20-35	15-25	NP-5
	10-20	Gravelly loamy sand, loamy sand, gravelly sandy loam	SM	A-1, A-2	0	0	85-100	50-90	25-60	10-25	0-14	NP
	20-26	Very gravelly loam	GM, SM	A-1, A-2	0	0	45-70	35-50	25-45	20-35	25-35	NP-5
	26-60	Very gravelly loam, extremely gravelly loam, extremely gravelly clay loam	GM	A-1, A-2	0	0-30	25-60	15-45	15-40	15-35	25-40	NP-10
Rock outcrop----	0-60	Unweathered bedrock			0	0	---	---	---	---	---	---
262:												
Zynbar----------	0-9	Silt loam	MH, ML	A-5, A-7	0	0-5	85-100	75-95	60-70	50-60	45-70	5-20
	9-45	Gravelly silt loam, gravelly loam	MH, ML	A-5, A-7	0	0-5	75-95	55-75	55-75	50-75	45-70	5-20
	45-60	Silt loam, loam	MH, ML	A-5, A-7	0	0-5	90-100	75-95	60-90	50-80	45-70	5-20
263:												
Water-----------	---	---	---	---	---	---	---	---	---	---	---	---

Table 17.--Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (K_{sat})	Available water capacity	Linear extensibility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodibility group	Wind erodibility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
1:												
Andaquepts------------	0-12	0-0	0.85-0.95	0.6-2.0	0.16-0.18	0.0-2.9	5.0-10	.37	.37	3	5	56
	12-37	0-0	0.85-0.95	0.6-6.0	0.10-0.20	3.0-5.9	1.0-5.0	.32	.37			
	37-60	0-0	0.85-0.95	0.06-0.2	0.16-0.20	3.0-5.9	0.0-1.0	.32	.37			
2:												
Andic Cryaquepts------	0-11	0-0	0.65-0.95	2.0-6.0	0.11-0.15	0.0-2.9	5.0-10	.15	.28	2	4	86
	11-35	0-0	0.65-0.95	0.6-20.0	0.05-0.15	0.0-2.9	2.0-5.0	.17	.32			
	35-60	5-20	1.10-1.30	0.6-6.0	0.07-0.11	0.0-2.9	1.0-2.0	.10	.37			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
3:												
Andic Cryumbrepts-----	0-17	0-0	0.65-0.85	0.6-2.0	0.11-0.14	0.0-2.9	2.0-5.0	.20	.32	5	6	48
	17-23	0-0	0.65-0.85	0.6-2.0	0.13-0.17	0.0-2.9	0.0-1.0	.20	.32			
	23-39	0-0	0.65-0.85	0.6-2.0	0.09-0.13	3.0-5.9	0.0-0.5	.10	.28			
	39-60	0-0	0.65-0.85	0.6-2.0	0.13-0.17	3.0-5.9	0.0-0.5	.17	.28			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
4:												
Andic Cryumbrepts-----	0-5	0-2	1.30-1.50	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.24	3	2	134
	5-23	0-0	0.85-0.95	0.6-2.0	0.11-0.13	0.0-2.9	0.0-0.5	.24	.32			
	23-35	0-0	0.85-1.20	0.6-2.0	0.09-0.13	3.0-5.9	0.0-0.5	.10	.28			
	35-60	0-0	0.85-1.40	0.6-2.0	0.13-0.17	3.0-5.9	0.0-0.5	.17	.32			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
5:												
Arents----------------	0-10	5-15	0.85-1.40	2.0-6.0	0.02-0.04	0.0-2.9	0.0-2.0	.10	.37	5	5	56
	10-60	5-25	1.20-1.70	0.6-6.0	0.05-0.12	0.0-2.9	0.0-2.0	.05	.32			
6:												
Astoria---------------	0-15	18-25	0.85-0.95	0.6-2.0	0.25-0.30	0.0-2.9	10-15	.32	.32	5	5	56
	15-60	35-60	0.90-1.20	0.6-2.0	0.25-0.30	3.0-5.9	1.0-5.0	.37	.43			
7:												
Baumgard--------------	0-11	18-25	0.75-1.00	0.6-2.0	0.16-0.18	0.0-2.9	5.0-10	.28	.32	3	5	56
	11-18	20-35	1.20-1.40	0.6-2.0	0.16-0.18	0.0-2.9	2.0-4.0	.20	.28			
	18-50	27-35	1.20-1.40	0.6-2.0	0.11-0.14	0.0-2.9	1.0-2.0	.15	.28			
	50-54	---	---	---	---	---	---	---	---			
8:												
Baumgard--------------	0-11	18-25	0.75-1.00	0.6-2.0	0.16-0.18	0.0-2.9	5.0-10	.28	.32	3	5	56
	11-18	20-35	1.20-1.40	0.6-2.0	0.16-0.18	0.0-2.9	2.0-4.0	.20	.28			
	18-50	27-35	1.20-1.40	0.6-2.0	0.11-0.14	0.0-2.9	1.0-2.0	.15	.28			
	50-54	---	---	---	---	---	---	---	---			
9:												
Beigle----------------	0-13	0-0	0.80-0.90	0.6-2.0	0.18-0.24	0.0-2.9	5.0-10	.32	.43	3	5	56
	13-42	0-0	0.80-0.90	0.6-2.0	0.15-0.20	0.0-2.9	2.0-4.0	.32	.43			
	42-46	0-0	0.90-1.30	0.6-2.0	0.10-0.15	0.0-2.9	0.0-1.0	.32	.43			
	46-50	---	---	---	---	---	---	---	---			
10:												
Beigle----------------	0-13	0-0	0.80-0.90	0.6-2.0	0.18-0.24	0.0-2.9	5.0-10	.32	.43	3	5	56
	13-42	0-0	0.80-0.90	0.6-2.0	0.15-0.20	0.0-2.9	2.0-4.0	.32	.43			
	42-46	0-0	0.90-1.30	0.6-2.0	0.10-0.15	0.0-2.9	0.0-1.0	.32	.43			
	46-50	---	---	---	---	---	---	---	---			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
11:												
Boistfort	0-16	0-0	0.75-0.90	0.6-2.0	0.20-0.24	0.0-2.9	10-15	.28	.32	5	5	56
	16-27	0-0	0.75-0.90	0.6-2.0	0.19-0.21	0.0-2.9	1.0-5.0	.24	.28			
	27-60	0-0	0.85-1.10	0.6-2.0	0.15-0.17	0.0-2.9	0.0-0.5	.24	.28			
12:												
Buckpeak	0-21	15-25	1.00-1.30	0.6-2.0	0.19-0.21	0.0-2.9	3.0-8.0	.32	.32	5	5	56
	21-37	20-35	1.20-1.45	0.6-2.0	0.17-0.21	3.0-5.9	1.0-3.0	.15	.15			
	37-60	20-35	1.20-1.40	0.6-2.0	0.19-0.21	3.0-5.9	0.0-1.0	.10	.10			
13:												
Buckpeak	0-21	15-25	1.00-1.30	0.6-2.0	0.19-0.21	0.0-2.9	3.0-8.0	.32	.32	5	5	56
	21-37	20-35	1.20-1.45	0.6-2.0	0.17-0.21	3.0-5.9	1.0-3.0	.15	.15			
	37-60	20-35	1.20-1.40	0.6-2.0	0.19-0.21	3.0-5.9	0.0-1.0	.10	.10			
14:												
Bunker	0-12	0-0	0.85-1.00	0.6-2.0	0.19-0.22	0.0-2.9	5.0-15	.28	.32	3	5	56
	12-27	0-0	0.85-1.00	0.6-2.0	0.16-0.20	0.0-2.9	2.0-5.0	.20	.32			
	27-42	0-0	0.85-1.00	0.6-2.0	0.16-0.20	0.0-2.9	0.0-1.0	.28	.32			
	42-46	---	---	---	---	---	---	---	---			
15:												
Bunker	0-12	0-0	0.85-1.00	0.6-2.0	0.19-0.22	0.0-2.9	5.0-15	.28	.32	3	5	56
	12-27	0-0	0.85-1.00	0.6-2.0	0.16-0.20	0.0-2.9	2.0-5.0	.20	.32			
	27-42	0-0	0.85-1.00	0.6-2.0	0.16-0.20	0.0-2.9	0.0-1.0	.28	.32			
	42-46	---	---	---	---	---	---	---	---			
16:												
Camas	0-4	10-20	1.30-1.50	2.0-6.0	0.11-0.14	0.0-2.9	1.0-3.0	.20	.24	2	6	48
	4-22	10-20	1.30-1.50	2.0-6.0	0.07-0.10	0.0-2.9	0.5-2.0	.15	.24			
	22-60	5-10	1.40-1.60	20.0-20.0	0.03-0.06	0.0-2.9	0.0-1.0	.10	.20			
17:												
Caples	0-9	27-35	1.05-1.25	0.6-2.0	0.18-0.20	3.0-5.9	1.0-3.0	.32	.32	5	7	38
	9-39	35-45	1.20-1.40	0.06-0.2	0.18-0.20	6.0-8.9	1.0-2.0	.28	.28			
	39-60	35-45	1.20-1.40	0.06-0.2	0.17-0.19	6.0-8.9	1.0-2.0	.28	.28			
18:												
Carrolls	0-7	0-5	1.50-1.65	6.0-20.0	0.05-0.09	0.0-2.9	0.0-0.5	.05	.05	5	1	180
	7-10	5-10	1.45-1.55	2.0-6.0	0.14-0.17	0.0-2.9	0.0-0.5	.43	.43			
	10-60	0-5	1.50-1.60	6.0-20.0	0.08-0.10	0.0-2.9	0.0-0.5	.10	.10			
19:												
Carrolls	0-7	0-5	1.50-1.70	6.0-20.0	0.09-0.11	0.0-2.9	0.0-0.5	.24	.24	5	2	134
	7-10	5-10	1.45-1.55	2.0-6.0	0.14-0.17	0.0-2.9	0.0-0.5	.43	.43			
	10-60	0-5	1.50-1.60	6.0-20.0	0.08-0.10	0.0-2.9	0.0-0.5	.10	.10			
20:												
Carrolls	0-10	0-5	1.45-1.65	2.0-6.0	0.14-0.16	0.0-2.9	0.0-0.5	.32	.32	2	3	86
	10-60	0-5	1.50-1.60	6.0-20.0	0.08-0.10	0.0-2.9	0.0-0.5	.10	.10			
21:												
Centralia	0-10	15-25	1.15-1.35	0.6-2.0	0.19-0.25	0.0-2.9	3.0-8.0	.32	.32	5	5	56
	10-41	27-35	1.20-1.40	0.6-2.0	0.12-0.20	3.0-5.9	1.0-3.0	.28	.28			
	41-60	22-35	1.20-1.45	0.6-2.0	0.12-0.20	3.0-5.9	0.0-1.0	.32	.32			
22:												
Centralia	0-10	15-25	1.15-1.35	0.6-2.0	0.19-0.25	0.0-2.9	3.0-8.0	.32	.32	5	5	56
	10-41	27-35	1.20-1.40	0.6-2.0	0.12-0.20	3.0-5.9	1.0-3.0	.28	.28			
	41-60	22-35	1.20-1.45	0.6-2.0	0.12-0.20	3.0-5.9	0.0-1.0	.32	.32			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
23:												
Centralia-------------	0-10	15-25	1.15-1.35	0.6-2.0	0.19-0.25	0.0-2.9	3.0-8.0	.32	.32	5	5	56
	10-41	27-35	1.20-1.40	0.6-2.0	0.12-0.20	3.0-5.9	1.0-3.0	.28	.28			
	41-60	22-35	1.20-1.45	0.6-2.0	0.12-0.20	3.0-5.9	0.0-1.0	.32	.32			
24:												
Cinebar---------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	5	2	134
	5-21	18-25	0.65-0.85	0.6-2.0	0.30-0.40	0.0-2.9	1.0-3.0	.28	.32			
	21-60	18-25	0.65-0.85	0.6-2.0	0.25-0.35	0.0-2.9	0.0-1.0	.32	.37			
25:												
Cinebar---------------	0-10	18-25	0.65-0.85	0.6-2.0	0.30-0.40	0.0-2.9	3.0-9.0	.28	.32	5	5	56
	10-23	18-25	0.65-0.85	0.6-2.0	0.25-0.35	0.0-2.9	1.0-3.0	.32	.37			
	23-60	18-25	0.65-1.00	0.6-2.0	0.20-0.30	0.0-2.9	0.5-1.0	.32	.37			
26:												
Cinebar---------------	0-10	18-25	0.65-0.85	0.6-2.0	0.30-0.40	0.0-2.9	3.0-9.0	.28	.32	5	5	56
	10-23	18-25	0.65-0.85	0.6-2.0	0.25-0.35	0.0-2.9	1.0-3.0	.32	.37			
	23-60	18-25	0.65-1.00	0.6-2.0	0.20-0.30	0.0-2.9	0.5-1.0	.32	.37			
27:												
Cinebar---------------	0-10	18-25	0.65-0.85	0.6-2.0	0.30-0.40	0.0-2.9	3.0-9.0	.28	.32	5	5	56
	10-23	18-25	0.65-0.85	0.6-2.0	0.25-0.35	0.0-2.9	1.0-3.0	.32	.37			
	23-60	18-25	0.65-1.00	0.6-2.0	0.20-0.30	0.0-2.9	0.5-1.0	.32	.37			
28:												
Cinebar---------------	0-10	18-25	0.65-0.85	0.6-2.0	0.30-0.40	0.0-2.9	3.0-9.0	.28	.32	5	5	56
	10-23	18-25	0.65-0.85	0.6-2.0	0.25-0.35	0.0-2.9	1.0-3.0	.32	.37			
	23-60	18-25	0.65-1.00	0.6-2.0	0.20-0.30	0.0-2.9	0.5-1.0	.32	.37			
29:												
Cinnamon--------------	0-3	0-0	0.75-0.90	0.6-2.0	0.11-0.15	0.0-2.9	2.0-3.0	.20	.24	5	2	134
	3-22	0-0	0.80-0.90	0.6-2.0	0.08-0.13	0.0-2.9	1.0-2.0	.20	.24			
	22-60	0-0	0.80-0.90	0.6-2.0	0.11-0.18	0.0-2.9	0.0-1.0	.24	.28			
30:												
Cinnamon--------------	0-3	0-0	0.75-0.90	0.6-2.0	0.11-0.15	0.0-2.9	2.0-3.0	.20	.24	5	2	134
	3-22	0-0	0.80-0.90	0.6-2.0	0.08-0.13	0.0-2.9	1.0-2.0	.20	.24			
	22-60	0-0	0.80-0.90	0.6-2.0	0.11-0.18	0.0-2.9	0.0-1.0	.24	.28			
31:												
Cinnamon--------------	0-3	0-0	0.75-0.90	0.6-2.0	0.11-0.15	0.0-2.9	2.0-3.0	.20	.24	5	2	134
	3-22	0-0	0.80-0.90	0.6-2.0	0.08-0.13	0.0-2.9	1.0-2.0	.20	.24			
	22-60	0-0	0.80-0.90	0.6-2.0	0.11-0.18	0.0-2.9	0.0-1.0	.24	.28			
32:												
Clato-----------------	0-11	10-18	1.15-1.35	0.6-2.0	0.19-0.21	0.0-2.9	2.0-5.0	.37	.37	5	5	56
	11-80	10-18	1.25-1.45	0.6-2.0	0.17-0.20	0.0-2.9	0.5-2.0	.43	.43			
33:												
Coweeman--------------	0-7	18-27	1.15-1.30	0.6-2.0	0.18-0.21	0.0-2.9	1.0-3.0	.37	.37	3	6	48
	7-14	35-50	1.20-1.35	0.06-0.2	0.15-0.18	6.0-8.9	1.0-2.0	.24	.24			
	14-70	40-60	1.20-1.45	0.01-0.06	0.12-0.17	6.0-8.9	0.0-1.0	.20	.20			
34:												
Coweeman--------------	0-7	27-35	1.10-1.25	0.2-0.6	0.16-0.18	3.0-5.9	1.0-3.0	.32	.32	5	7	38
	7-14	35-50	1.20-1.35	0.06-0.2	0.15-0.18	6.0-8.9	1.0-2.0	.24	.24			
	14-70	40-60	1.20-1.45	0.01-0.06	0.12-0.17	6.0-8.9	0.0-1.0	.20	.20			
35:												
Cowlitz---------------	0-10	0-5	1.45-1.65	6.0-20.0	0.03-0.05	0.0-2.9	1.0-3.0	.02	.20	5	2	134
	10-60	0-5	1.35-1.55	6.0-20.0	0.03-0.05	0.0-2.9	1.0-2.0	.02	.20			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (K_{sat})	Available water capacity	Linear extensibility	Organic matter	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
36:												
Cowlitz---------------	0-11	0-5	1.35-1.55	6.0-20.0	0.03-0.05	0.0-2.9	1.0-3.0	.02	.15	5	4	86
	11-60	0-5	1.40-1.60	6.0-20.0	0.03-0.05	0.0-2.9	0.0-0.5	.02	.20			
37:												
Cowlitz---------------	0-11	0-5	1.35-1.55	6.0-20.0	0.03-0.05	0.0-2.9	1.0-3.0	.02	.15	5	4	86
	11-60	0-5	1.40-1.60	6.0-20.0	0.03-0.05	0.0-2.9	0.0-0.5	.02	.20			
38:												
Cowlitz---------------	0-11	0-5	1.35-1.55	6.0-20.0	0.03-0.05	0.0-2.9	1.0-3.0	.02	.15	5	4	86
	11-60	0-5	1.40-1.60	6.0-20.0	0.03-0.05	0.0-2.9	0.0-0.5	.02	.20			
39:												
Delameter-------------	0-10	1-5	0.70-1.50	6.0-20.0	0.07-0.09	0.0-2.9	0.0-0.5	.10	.17	5	5	56
	10-60	1-5	0.70-1.50	6.0-20.0	0.03-0.05	0.0-2.9	0.0-0.5	.05	.20			
40:												
Dobbs-----------------	0-4	0-0	0.65-0.90	0.6-2.0	0.15-0.19	0.0-2.9	10-15	.20	.32	3	6	48
	4-14	0-0	0.65-0.90	0.6-2.0	0.15-0.19	0.0-2.9	5.0-9.0	.20	.32			
	14-35	0-0	0.65-0.90	0.6-2.0	0.10-0.15	0.0-2.9	3.0-5.0	.15	.32			
	35-60	---	---	---	---	---	---	---	---			
41:												
Dobbs-----------------	0-4	0-0	0.65-0.90	0.6-2.0	0.15-0.19	0.0-2.9	10-15	.20	.32	3	6	48
	4-14	0-0	0.65-0.90	0.6-2.0	0.15-0.19	0.0-2.9	5.0-9.0	.20	.32			
	14-35	0-0	0.65-0.90	0.6-2.0	0.10-0.15	0.0-2.9	3.0-5.0	.15	.32			
	35-60	---	---	---	---	---	---	---	---			
42:												
Domell----------------	0-5	0-0	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.17	5	2	134
	5-13	0-0	0.65-0.85	0.6-2.0	0.11-0.13	0.0-2.9	0.0-2.0	.17	.24			
	13-39	0-0	0.65-0.85	0.6-2.0	0.12-0.14	0.0-2.9	0.0-2.0	.20	.24			
	39-60	0-0	0.65-1.10	0.6-2.0	0.11-0.14	0.0-2.9	0.0-2.0	.20	.28			
43:												
Domell----------------	0-8	0-0	0.65-0.85	0.6-2.0	0.11-0.13	0.0-2.9	5.0-10	.17	.20	5	3	86
	8-23	0-0	0.65-0.85	0.6-2.0	0.12-0.14	0.0-2.9	2.0-5.0	.20	.24			
	23-60	0-0	0.65-1.00	0.6-2.0	0.11-0.14	0.0-2.9	0.0-1.0	.20	.28			
44:												
Domell----------------	0-8	0-0	0.65-0.85	0.6-2.0	0.11-0.13	0.0-2.9	5.0-10	.17	.20	5	3	86
	8-23	0-0	0.65-0.85	0.6-2.0	0.12-0.14	0.0-2.9	2.0-5.0	.20	.24			
	23-60	0-0	0.65-1.00	0.6-2.0	0.11-0.14	0.0-2.9	0.0-1.0	.20	.28			
45:												
Domell----------------	0-12	0-0	0.65-0.85	0.6-2.0	0.11-0.13	0.0-2.9	5.0-10	.15	.24	5	3	86
	12-23	0-0	0.65-0.85	0.6-2.0	0.12-0.14	0.0-2.9	1.0-5.0	.20	.28			
	23-60	0-0	0.65-1.10	0.6-2.0	0.11-0.14	0.0-2.9	0.0-0.5	.20	.28			
46:												
Domell----------------	0-12	0-0	0.65-0.85	0.6-2.0	0.11-0.13	0.0-2.9	5.0-10	.15	.24	5	3	86
	12-23	0-0	0.65-0.85	0.6-2.0	0.12-0.14	0.0-2.9	1.0-5.0	.20	.28			
	23-60	0-0	0.65-1.10	0.6-2.0	0.11-0.14	0.0-2.9	0.0-0.5	.20	.28			
47:												
Edgewick--------------	0-4	5-10	1.20-1.40	2.0-6.0	0.16-0.19	0.0-2.9	3.0-5.0	.37	.37	4	5	56
	4-25	5-10	1.30-1.50	2.0-6.0	0.10-0.14	0.0-2.9	1.0-2.0	.28	.32			
	25-32	5-10	1.30-1.50	2.0-6.0	0.07-0.13	0.0-2.9	0.0-1.0	.32	.37			
	32-60	0-15	1.50-1.65	20.0-20.0	0.02-0.05	0.0-2.9	0.0-0.5	.05	.20			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
48:												
Elkprairie------------	0-6	0-0	0.90-1.10	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	5	2	134
	6-17	0-0	0.90-1.10	2.0-6.0	0.03-0.05	0.0-2.9	3.0-5.0	.05	.20			
	17-23	0-0	0.90-1.10	2.0-6.0	0.08-0.12	0.0-2.9	1.0-2.0	.15	.24			
	23-36	0-0	0.65-0.85	0.6-2.0	0.11-0.18	0.0-2.9	0.0-1.0	.20	.32			
	36-60	0-0	0.65-0.85	0.6-2.0	0.20-0.30	0.0-2.9	0.0-0.5	.32	.32			
49:												
Elochoman-------------	0-12	0-0	0.65-0.85	0.6-2.0	0.25-0.35	0.0-2.9	6.0-15	.32	.32	5	5	56
	12-26	0-0	0.65-0.85	0.6-2.0	0.20-0.30	0.0-2.9	2.0-5.0	.37	.37			
	26-60	0-0	0.75-0.90	0.6-2.0	0.20-0.30	0.0-2.9	0.0-1.0	.37	.37			
50:												
Ferteg----------------	0-6	0-0	0.65-0.85	0.6-2.0	0.19-0.21	0.0-2.9	5.0-15	.28	.28	5	5	56
	6-25	0-0	0.65-0.85	0.6-2.0	0.19-0.21	0.0-2.9	2.0-5.0	.32	.32			
	25-34	20-35	1.20-1.40	0.6-2.0	0.17-0.21	3.0-5.9	0.0-1.0	.32	.32			
	34-60	27-45	1.15-1.35	0.06-0.2	0.15-0.19	3.0-5.9	0.0-1.0	.28	.28			
51:												
Ferteg----------------	0-6	0-0	0.65-0.85	0.6-2.0	0.19-0.21	0.0-2.9	5.0-15	.28	.28	5	5	56
	6-25	0-0	0.65-0.85	0.6-2.0	0.19-0.21	0.0-2.9	2.0-5.0	.32	.32			
	25-34	20-35	1.20-1.40	0.6-2.0	0.17-0.21	3.0-5.9	0.0-1.0	.32	.32			
	34-60	27-45	1.15-1.35	0.06-0.2	0.15-0.19	3.0-5.9	0.0-1.0	.28	.28			
52:												
Forsyth---------------	0-7	0-0	1.10-1.30	2.0-6.0	0.06-0.08	0.0-2.9	0.5-2.0	.05	.15	5	3	86
	7-60	0-0	1.15-1.40	6.0-20.0	0.04-0.08	0.0-2.9	0.0-0.5	.02	.15			
53:												
Forsyth---------------	0-7	0-0	1.10-1.30	2.0-6.0	0.06-0.08	0.0-2.9	0.5-2.0	.05	.15	5	3	86
	7-60	0-0	1.15-1.40	6.0-20.0	0.04-0.08	0.0-2.9	0.0-0.5	.02	.15			
54:												
Germany---------------	0-22	0-0	0.90-1.00	0.6-2.0	0.19-0.24	0.0-2.9	5.0-15	.28	.32	5	5	56
	22-49	25-40	1.00-1.35	0.6-2.0	0.19-0.21	0.0-2.9	1.0-5.0	.32	.32			
	49-72	25-40	1.10-1.40	0.6-2.0	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
55:												
Germany---------------	0-22	0-0	0.90-1.00	0.6-2.0	0.19-0.24	0.0-2.9	5.0-15	.28	.32	5	5	56
	22-49	25-40	1.00-1.35	0.6-2.0	0.19-0.21	0.0-2.9	1.0-5.0	.32	.32			
	49-72	25-40	1.10-1.40	0.6-2.0	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
56:												
Germany---------------	0-22	0-0	0.90-1.00	0.6-2.0	0.19-0.24	0.0-2.9	5.0-15	.28	.32	5	5	56
	22-49	25-40	1.00-1.35	0.6-2.0	0.19-0.21	0.0-2.9	1.0-5.0	.32	.32			
	49-72	25-40	1.10-1.40	0.6-2.0	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
57:												
Germany---------------	0-22	0-0	0.90-1.00	0.6-2.0	0.19-0.24	0.0-2.9	5.0-15	.28	.32	5	5	56
	22-49	25-40	1.00-1.35	0.6-2.0	0.19-0.21	0.0-2.9	1.0-5.0	.32	.32			
	49-72	25-40	1.10-1.40	0.6-2.0	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
58:												
Germany---------------	0-22	0-0	0.90-1.00	0.6-2.0	0.19-0.24	0.0-2.9	5.0-15	.28	.32	4	5	56
	22-49	25-40	1.00-1.35	0.6-2.0	0.19-0.21	0.0-2.9	2.0-4.0	.32	.32			
	49-59	---	---	---	---	---	---	---	---			
59:												
Germany---------------	0-22	0-0	0.90-1.00	0.6-2.0	0.19-0.24	0.0-2.9	5.0-15	.28	.32	4	5	56
	22-49	25-40	1.00-1.35	0.6-2.0	0.19-0.21	0.0-2.9	2.0-4.0	.32	.32			
	49-59	---	---	---	---	---	---	---	---			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
60:												
Germany---------------	0-22	0-0	0.90-1.00	0.6-2.0	0.19-0.24	0.0-2.9	5.0-15	.28	.32	4	5	56
	22-49	25-40	1.00-1.35	0.6-2.0	0.19-0.21	0.0-2.9	2.0-4.0	.32	.32			
	49-59	---	---	---	---	---	---	---	---			
61:												
Gobar-----------------	0-10	0-0	0.85-1.00	0.6-2.0	0.20-0.24	0.0-2.9	5.0-10	.32	.37	4	5	56
	10-46	18-35	0.90-1.10	0.6-2.0	0.19-0.21	3.0-5.9	0.5-1.0	.32	.37			
	46-56	---	---	---	---	---	---	---	---			
62:												
Gobar-----------------	0-10	0-0	0.85-1.00	0.6-2.0	0.20-0.24	0.0-2.9	5.0-10	.32	.37	4	5	56
	10-46	18-35	0.90-1.10	0.6-2.0	0.19-0.21	3.0-5.9	0.5-1.0	.32	.37			
	46-56	---	---	---	---	---	---	---	---			
63:												
Gobar-----------------	0-10	0-0	0.85-1.00	0.6-2.0	0.20-0.24	0.0-2.9	5.0-10	.32	.37	4	5	56
	10-46	18-35	0.90-1.10	0.6-2.0	0.19-0.21	3.0-5.9	0.5-1.0	.32	.37			
	46-56	---	---	---	---	---	---	---	---			
64:												
Gobar-----------------	0-10	0-0	0.85-1.00	0.6-2.0	0.20-0.24	0.0-2.9	5.0-10	.32	.37	4	6	48
	10-46	18-35	0.90-1.10	0.6-2.0	0.19-0.21	3.0-5.9	0.5-1.0	.32	.37			
	46-56	---	---	---	---	---	---	---	---			
65:												
Godfrey---------------	0-5	18-27	1.15-1.35	0.6-2.0	0.20-0.24	0.0-2.9	0.5-2.0	.32	.32	5	5	56
	5-27	35-50	1.15-1.40	0.06-0.2	0.14-0.18	6.0-8.9	0.5-1.0	.24	.24			
	27-60	40-50	1.15-1.40	0.01-0.06	0.13-0.15	6.0-8.9	0.5-1.0	.24	.24			
66:												
Greenwater------------	0-8	0-5	1.25-1.45	6.0-20.0	0.06-0.08	0.0-2.9	1.0-5.0	.17	.20	4	2	134
	8-22	0-5	1.40-1.60	6.0-20.0	0.06-0.08	0.0-2.9	0.0-1.0	.17	.24			
	22-60	0-5	1.45-1.65	6.0-20.0	0.05-0.07	0.0-2.9	0.0-0.5	.10	.10			
67:												
Greenwater------------	0-8	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	5	2	134
	8-22	0-5	1.40-1.60	6.0-20.0	0.06-0.08	0.0-2.9	0.0-0.5	.17	.20			
	22-60	0-5	1.40-1.60	6.0-20.0	0.05-0.07	0.0-2.9	0.0-0.5	.10	.10			
68:												
Greenwater------------	0-8	0-5	1.25-1.45	6.0-20.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.20	4	2	134
	8-19	0-5	1.40-1.60	6.0-20.0	0.06-0.08	0.0-2.9	0.0-1.0	.17	.24			
	19-60	0-5	1.45-1.65	6.0-20.0	0.05-0.07	0.0-2.9	0.0-0.5	.10	.10			
69:												
Greenwater------------	0-8	0-5	1.20-1.40	2.0-6.0	0.10-0.12	0.0-2.9	1.0-5.0	.20	.24	4	3	86
	8-22	0-5	1.40-1.60	6.0-20.0	0.06-0.08	0.0-2.9	0.0-1.0	.17	.24			
	22-60	0-5	1.45-1.65	6.0-20.0	0.05-0.07	0.0-2.9	0.0-0.5	.10	.10			
70:												
Hatchet---------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-23	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-0.5	.05	.28			
	23-38	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-0.5	.05	.28			
	38-42	---	---	---	---	---	---	---	---			
71:												
Hatchet---------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-23	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-0.5	.05	.28			
	23-38	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-0.5	.05	.28			
	38-42	---	---	---	---	---	---	---	---			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
72:												
Hatchet---------------	0-11	0-0	0.85-1.10	0.6-2.0	0.08-0.11	0.0-2.9	1.0-5.0	.10	.24	2	5	56
	11-21	0-0	0.85-1.10	0.6-2.0	0.06-0.10	0.0-2.9	1.0-2.0	.05	.28			
	21-36	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-1.0	.05	.28			
	36-40	---	---	---	---	---	---	---	---			
73:												
Hatchet---------------	0-11	0-0	0.85-1.10	0.6-2.0	0.08-0.11	0.0-2.9	1.0-5.0	.10	.24	2	5	56
	11-21	0-0	0.85-1.10	0.6-2.0	0.06-0.10	0.0-2.9	1.0-2.0	.05	.28			
	21-36	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-1.0	.05	.28			
	36-40	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
74:												
Hatchet---------------	0-11	0-0	0.85-1.10	0.6-2.0	0.08-0.11	0.0-2.9	1.0-5.0	.10	.24	2	5	56
	11-21	0-0	0.85-1.10	0.6-2.0	0.06-0.10	0.0-2.9	1.0-2.0	.05	.28			
	21-36	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-1.0	.05	.28			
	36-40	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
75:												
Hatchet---------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-23	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-0.5	.05	.28			
	23-38	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-0.5	.05	.28			
	38-42	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
76:												
Hazeldell-------------	0-7	20-27	1.10-1.35	0.6-2.0	0.19-0.24	3.0-5.9	5.0-10	.24	.37	5	7	38
	7-28	20-30	1.10-1.35	0.6-2.0	0.18-0.24	3.0-5.9	1.0-2.0	.24	.37			
	28-40	20-35	1.10-1.45	0.6-2.0	0.13-0.21	3.0-5.9	0.0-1.0	.24	.32			
	40-60	35-70	1.25-1.45	0.6-2.0	0.13-0.20	3.0-5.9	0.0-0.5	.24	.28			
77:												
Hazeldell-------------	0-7	20-27	1.10-1.35	0.6-2.0	0.19-0.24	3.0-5.9	5.0-10	.24	.37	5	7	38
	7-28	20-30	1.10-1.35	0.6-2.0	0.18-0.24	3.0-5.9	1.0-2.0	.24	.37			
	28-40	20-35	1.10-1.45	0.6-2.0	0.13-0.21	3.0-5.9	0.0-1.0	.24	.32			
	40-60	35-70	1.25-1.45	0.6-2.0	0.13-0.20	3.0-5.9	0.0-0.5	.24	.28			
78:												
Hazeldell-------------	0-7	20-27	1.10-1.35	0.6-2.0	0.19-0.24	3.0-5.9	5.0-10	.24	.37	5	7	38
	7-28	20-30	1.10-1.35	0.6-2.0	0.18-0.24	3.0-5.9	1.0-2.0	.24	.37			
	28-40	20-35	1.10-1.45	0.6-2.0	0.13-0.21	3.0-5.9	0.0-1.0	.24	.32			
	40-60	35-70	1.25-1.45	0.6-2.0	0.13-0.20	3.0-5.9	0.0-0.5	.24	.28			
79:												
Hazeldell-------------	0-7	20-27	1.10-1.35	0.6-2.0	0.19-0.24	3.0-5.9	5.0-10	.24	.37	4	7	38
	7-28	25-40	1.10-1.45	0.2-0.6	0.13-0.21	3.0-5.9	2.0-5.0	.24	.32			
	28-40	25-40	1.25-1.45	0.2-0.6	0.13-0.20	3.0-5.9	0.0-1.0	.24	.28			
	40-50	30-40	1.25-1.45	0.2-0.6	0.13-0.18	3.0-5.9	0.0-1.0	.24	.32			
	50-60	---	---	---	---	---	---	---	---			
80:												
Hazeldell-------------	0-7	20-27	1.10-1.35	0.6-2.0	0.19-0.24	3.0-5.9	5.0-10	.24	.37	4	7	38
	7-28	25-40	1.10-1.45	0.2-0.6	0.13-0.21	3.0-5.9	2.0-5.0	.24	.32			
	28-40	25-40	1.25-1.45	0.2-0.6	0.13-0.20	3.0-5.9	0.0-1.0	.24	.28			
	40-50	30-40	1.25-1.45	0.2-0.6	0.13-0.18	3.0-5.9	0.0-1.0	.24	.32			
	50-60	---	---	---	---	---	---	---	---			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
81:												
Histic Cryaquepts-----	0-13	0-0	0.25-0.60	0.6-2.0	0.30-0.40	0.0-2.9	40-70	---	---	3	8	0
	13-21	0-5	1.15-1.35	6.0-20.0	0.06-0.10	0.0-2.9	10-15	.17	.17			
	21-31	5-10	1.20-1.40	2.0-6.0	0.08-0.12	0.0-2.9	5.0-10	.15	.28			
	31-35	0-0	0.25-0.60	0.6-2.0	0.30-0.40	0.0-2.9	40-70	---	---			
	35-60	0-2	1.30-1.50	20.0-20.0	0.02-0.06	0.0-2.9	10-20	.05	.17			
82:												
Histic Humaquepts-----	0-8	0-0	0.50-0.80	0.6-2.0	0.25-0.30	0.0-2.9	30-60	---	---	3	8	0
	8-20	5-15	1.20-1.40	2.0-6.0	0.07-0.11	0.0-2.9	0.5-1.0	.15	.32			
	20-60	5-15	1.40-1.60	2.0-6.0	0.04-0.07	0.0-2.9	0.5-1.0	.10	.32			
83:												
Hoffstadt-------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-9	0-0	0.85-1.10	0.6-2.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.24			
	9-15	0-0	0.85-1.10	0.6-2.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.24			
	15-23	0-0	0.85-1.10	0.6-2.0	0.03-0.05	0.0-2.9	0.5-1.0	.05	.28			
	23-52	0-0	0.85-1.10	0.6-2.0	0.03-0.05	0.0-2.9	0.0-0.5	.05	.28			
	52-56	---	---	---	---	---	---	---	---			
84:												
Hoffstadt-------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-9	0-0	0.85-1.10	0.6-2.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.24			
	9-15	0-0	0.85-1.10	0.6-2.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.24			
	15-23	0-0	0.85-1.10	0.6-2.0	0.03-0.05	0.0-2.9	0.5-1.0	.05	.28			
	23-52	0-0	0.85-1.10	0.6-2.0	0.03-0.05	0.0-2.9	0.0-0.5	.05	.28			
	52-56	---	---	---	---	---	---	---	---			
85:												
Hoffstadt-------------	0-4	0-0	0.65-0.85	0.6-2.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.24	3	5	56
	4-10	0-0	0.75-0.90	0.6-2.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.24			
	10-19	0-0	0.90-1.10	0.6-2.0	0.03-0.05	0.0-2.9	0.5-1.0	.05	.24			
	19-47	0-0	0.90-1.20	0.6-2.0	0.03-0.05	0.0-2.9	0.0-0.5	.05	.24			
	47-51	---	---	---	---	---	---	---	---			
86:												
Hoffstadt-------------	0-4	0-0	0.65-0.85	0.6-2.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.24	3	5	56
	4-10	0-0	0.75-0.90	0.6-2.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.24			
	10-19	0-0	0.90-1.10	0.6-2.0	0.03-0.05	0.0-2.9	0.5-1.0	.05	.24			
	19-47	0-0	0.90-1.20	0.6-2.0	0.03-0.05	0.0-2.9	0.0-0.5	.05	.24			
	47-51	---	---	---	---	---	---	---	---			
87:												
Hoffstadt-------------	0-4	0-0	0.65-0.85	0.6-2.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.24	3	5	56
	4-10	0-0	0.75-0.90	0.6-2.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.24			
	10-19	0-0	0.90-1.10	0.6-2.0	0.03-0.05	0.0-2.9	0.5-1.0	.05	.24			
	19-47	0-0	0.90-1.20	0.6-2.0	0.03-0.05	0.0-2.9	0.0-0.5	.05	.24			
	47-51	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
88:												
Hoffstadt-------------	0-4	0-0	0.65-0.85	0.6-2.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.24	3	5	56
	4-10	0-0	0.75-0.90	0.6-2.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.24			
	10-19	0-0	0.90-1.10	0.6-2.0	0.03-0.05	0.0-2.9	0.5-1.0	.05	.24			
	19-47	0-0	0.90-1.20	0.6-2.0	0.03-0.05	0.0-2.9	0.0-0.5	.05	.24			
	47-51	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
89:												
Hoffstadt-------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-9	0-0	0.85-1.10	0.6-2.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.24			
	9-15	0-0	0.85-1.10	0.6-2.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.24			
	15-23	0-0	0.85-1.10	0.6-2.0	0.03-0.05	0.0-2.9	0.5-1.0	.05	.28			
	23-52	0-0	0.85-1.10	0.6-2.0	0.03-0.05	0.0-2.9	0.0-0.5	.05	.28			
	52-56	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
90:												
Hoffstadt-------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-9	0-0	0.85-1.10	0.6-2.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.24			
	9-15	0-0	0.85-1.10	0.6-2.0	0.05-0.09	0.0-2.9	1.0-5.0	.10	.24			
	15-23	0-0	0.85-1.10	0.6-2.0	0.03-0.05	0.0-2.9	0.5-1.0	.05	.28			
	23-52	0-0	0.85-1.10	0.6-2.0	0.03-0.05	0.0-2.9	0.0-0.5	.05	.28			
	52-56	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
91:												
Jonas-----------------	0-8	0-0	0.85-1.00	0.6-2.0	0.25-0.35	0.0-2.9	5.0-10	.32	.32	5	5	56
	8-18	0-0	0.90-1.00	0.6-2.0	0.07-0.10	0.0-2.9	2.0-5.0	.10	.32			
	18-60	0-0	0.90-1.15	0.6-2.0	0.10-0.15	0.0-2.9	0.5-1.0	.20	.28			
92:												
Jonas-----------------	0-8	0-0	0.85-1.00	0.6-2.0	0.25-0.35	0.0-2.9	5.0-10	.32	.32	5	5	56
	8-18	0-0	0.90-1.00	0.6-2.0	0.07-0.10	0.0-2.9	2.0-5.0	.10	.32			
	18-60	0-0	0.90-1.15	0.6-2.0	0.10-0.15	0.0-2.9	0.5-1.0	.20	.28			
93:												
Kalama----------------	0-7	15-20	1.15-1.35	0.6-2.0	0.11-0.14	0.0-2.9	2.0-3.0	.20	.37	5	6	48
	7-17	15-20	1.20-1.50	0.6-2.0	0.11-0.14	0.0-2.9	1.0-2.0	.20	.37			
	17-21	18-35	1.20-1.45	0.6-2.0	0.11-0.14	3.0-5.9	0.0-1.0	.17	.32			
	21-31	18-35	1.20-1.40	0.2-0.6	0.11-0.14	3.0-5.9	0.0-0.5	.17	.32			
	31-60	18-35	1.20-1.50	0.2-0.6	0.08-0.11	3.0-5.9	0.0-0.5	.10	.32			
94:												
Kalama----------------	0-7	15-20	1.15-1.35	0.6-2.0	0.11-0.14	0.0-2.9	2.0-3.0	.20	.37	5	6	48
	7-17	15-20	1.20-1.50	0.6-2.0	0.11-0.14	0.0-2.9	1.0-2.0	.20	.37			
	17-21	18-35	1.20-1.45	0.6-2.0	0.11-0.14	3.0-5.9	0.0-1.0	.17	.32			
	21-31	18-35	1.20-1.40	0.2-0.6	0.11-0.14	3.0-5.9	0.0-0.5	.17	.32			
	31-60	18-35	1.20-1.50	0.2-0.6	0.08-0.11	3.0-5.9	0.0-0.5	.10	.32			
95:												
Kalama----------------	0-7	15-20	1.15-1.35	0.6-2.0	0.11-0.14	0.0-2.9	2.0-3.0	.20	.37	5	6	48
	7-17	15-20	1.20-1.50	0.6-2.0	0.11-0.14	0.0-2.9	1.0-2.0	.20	.37			
	17-21	18-35	1.20-1.45	0.6-2.0	0.11-0.14	3.0-5.9	0.0-1.0	.17	.32			
	21-31	18-35	1.20-1.40	0.2-0.6	0.11-0.14	3.0-5.9	0.0-0.5	.17	.32			
	31-60	18-35	1.20-1.50	0.2-0.6	0.08-0.11	3.0-5.9	0.0-0.5	.10	.32			
96:												
Katula----------------	0-5	0-0	0.85-1.00	0.6-2.0	0.07-0.11	0.0-2.9	5.0-10	.10	.28	2	7	38
	5-15	0-0	0.85-1.00	0.6-2.0	0.07-0.11	0.0-2.9	1.0-5.0	.05	.28			
	15-30	0-0	0.90-1.10	0.6-2.0	0.05-0.09	0.0-2.9	0.0-1.0	.05	.32			
	30-34	---	---	---	---	---	---	---	---			
97:												
Katula----------------	0-5	0-0	0.85-1.00	0.6-2.0	0.07-0.11	0.0-2.9	5.0-10	.10	.28	2	7	38
	5-15	0-0	0.85-1.00	0.6-2.0	0.07-0.11	0.0-2.9	1.0-5.0	.05	.28			
	15-30	0-0	0.90-1.10	0.6-2.0	0.05-0.09	0.0-2.9	0.0-1.0	.05	.32			
	30-34	---	---	---	---	---	---	---	---			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
98:												
Katula----------------	0-5	0-0	0.85-1.00	0.6-2.0	0.07-0.11	0.0-2.9	5.0-10	.10	.28	2	7	38
	5-15	0-0	0.85-1.00	0.6-2.0	0.07-0.11	0.0-2.9	1.0-5.0	.05	.28			
	15-30	0-0	0.90-1.10	0.6-2.0	0.05-0.09	0.0-2.9	0.0-1.0	.05	.32			
	30-34	---	---	---	---	---	---	---	---			
Bunker----------------	0-12	0-0	0.85-1.00	0.6-2.0	0.19-0.22	0.0-2.9	5.0-15	.28	.32	3	5	56
	12-27	0-0	0.85-1.00	0.6-2.0	0.16-0.20	0.0-2.9	2.0-5.0	.20	.32			
	27-42	0-0	0.85-1.00	0.6-2.0	0.16-0.20	0.0-2.9	0.0-1.0	.28	.32			
	42-46	---	---	---	---	---	---	---	---			
99:												
Katula----------------	0-5	0-0	0.85-1.00	0.6-2.0	0.07-0.11	0.0-2.9	5.0-10	.10	.28	2	7	38
	5-15	0-0	0.85-1.00	0.6-2.0	0.07-0.11	0.0-2.9	1.0-5.0	.05	.28			
	15-30	0-0	0.90-1.10	0.6-2.0	0.05-0.09	0.0-2.9	0.0-1.0	.05	.32			
	30-34	---	---	---	---	---	---	---	---			
Bunker----------------	0-12	0-0	0.85-1.00	0.6-2.0	0.19-0.22	0.0-2.9	5.0-15	.28	.32	3	5	56
	12-27	0-0	0.85-1.00	0.6-2.0	0.16-0.20	0.0-2.9	2.0-5.0	.20	.32			
	27-42	0-0	0.85-1.00	0.6-2.0	0.16-0.20	0.0-2.9	0.0-1.0	.28	.32			
	42-46	---	---	---	---	---	---	---	---			
100:												
Kelso-----------------	0-11	10-20	1.15-1.35	0.6-2.0	0.16-0.19	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	11-34	18-35	1.30-1.45	0.6-2.0	0.16-0.19	3.0-5.9	0.0-1.0	.43	.43			
	34-60	18-35	1.30-1.45	0.06-0.2	0.18-0.21	3.0-5.9	0.0-0.5	.43	.43			
101:												
Kelso-----------------	0-11	10-20	1.15-1.35	0.6-2.0	0.16-0.19	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	11-34	18-35	1.30-1.45	0.6-2.0	0.16-0.19	3.0-5.9	0.0-1.0	.43	.43			
	34-60	18-35	1.30-1.45	0.06-0.2	0.18-0.21	3.0-5.9	0.0-0.5	.43	.43			
102:												
Kelso-----------------	0-11	10-20	1.15-1.35	0.6-2.0	0.16-0.19	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	11-34	18-35	1.30-1.45	0.6-2.0	0.16-0.19	3.0-5.9	0.0-1.0	.43	.43			
	34-60	18-35	1.30-1.45	0.06-0.2	0.18-0.21	3.0-5.9	0.0-0.5	.43	.43			
103:												
Kelso-----------------	0-11	10-20	1.15-1.35	0.6-2.0	0.16-0.19	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	11-34	18-35	1.30-1.45	0.6-2.0	0.16-0.19	3.0-5.9	0.0-1.0	.43	.43			
	34-60	18-35	1.30-1.45	0.06-0.2	0.18-0.21	3.0-5.9	0.0-0.5	.43	.43			
104:												
Kosmos----------------	0-7	18-27	1.15-1.35	0.6-2.0	0.16-0.19	0.0-2.9	2.0-5.0	.43	.43	5	6	48
	7-12	18-30	1.20-1.40	0.2-0.6	0.16-0.19	3.0-5.9	1.0-2.0	.32	.32			
	12-47	25-35	1.25-1.45	0.06-0.2	0.15-0.18	0.0-2.9	0.0-1.0	.32	.32			
	47-60	10-25	1.40-1.60	2.0-6.0	0.09-0.12	0.0-2.9	0.0-0.5	.20	.20			
105:												
Lacamas---------------	0-4	15-25	1.15-1.35	0.6-2.0	0.19-0.21	0.0-2.9	2.0-7.0	.32	.32	5	5	56
	4-10	20-35	1.20-1.45	0.6-2.0	0.19-0.21	0.0-2.9	1.0-3.0	.32	.32			
	10-20	45-60	1.15-1.35	0.2-0.6	0.06-0.10	6.0-8.9	0.0-1.0	.20	.20			
	20-60	40-70	1.25-1.45	0.2-0.6	0.06-0.10	6.0-8.9	0.0-1.0	.20	.20			
106:												
Lates-----------------	0-12	0-0	0.85-0.90	0.6-2.0	0.20-0.24	0.0-2.9	6.0-15	.28	.32	2	5	56
	12-36	0-0	0.90-1.00	0.6-2.0	0.12-0.14	0.0-2.9	1.0-3.0	.24	.32			
	36-40	---	---	---	---	---	---	---	---			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
107:												
Lates-----------------	0-12	0-0	0.85-0.90	0.6-2.0	0.20-0.24	0.0-2.9	6.0-15	.28	.32	2	5	56
	12-36	0-0	0.90-1.00	0.6-2.0	0.12-0.14	0.0-2.9	1.0-3.0	.24	.32			
	36-40	---	---	---	---	---	---	---	---			
108:												
Lates-----------------	0-12	0-0	0.85-0.90	0.6-2.0	0.20-0.24	0.0-2.9	6.0-15	.28	.32	2	5	56
	12-36	0-0	0.90-1.00	0.6-2.0	0.12-0.14	0.0-2.9	1.0-3.0	.24	.32			
	36-40	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
109:												
Lithic Haplumbrepts---	0-8	5-10	1.10-1.30	2.0-6.0	0.08-0.11	0.0-2.9	5.0-10	.15	.28	1	4	86
	8-20	20-35	1.25-1.45	0.6-2.0	0.11-0.15	3.0-5.9	1.0-3.0	.20	.32			
	20-24	---	---	---	---	---	---	---	---			
110:												
Lithic Umbric Vitrandepts----------	0-6	0-0	0.65-0.85	2.0-6.0	0.09-0.13	0.0-2.9	5.0-10	.17	.28	1	3	86
	6-11	0-0	0.65-0.85	6.0-20.0	0.02-0.06	0.0-2.9	2.0-5.0	.10	.20			
	11-15	---	---	---	---	---	---	---	---			
111:												
Lonestar--------------	0-2	0-0	0.65-0.85	2.0-6.0	0.10-0.13	0.0-2.9	6.0-8.0	.28	.28	5	1	180
	2-17	0-0	0.80-0.90	0.6-2.0	0.11-0.15	0.0-2.9	5.0-10	.15	.28			
	17-24	0-0	0.80-0.90	2.0-6.0	0.08-0.12	0.0-2.9	3.0-5.0	.15	.24			
	24-60	0-0	0.65-0.85	0.6-2.0	0.11-0.18	0.0-2.9	1.0-2.0	.32	.37			
112:												
Lonestar--------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.20	.20	5	2	134
	5-17	0-0	0.65-0.85	0.6-2.0	0.13-0.18	0.0-2.9	5.0-10	.15	.24			
	17-24	0-0	0.80-0.90	0.6-2.0	0.11-0.15	0.0-2.9	3.0-5.0	.15	.24			
	24-30	0-0	0.80-0.90	2.0-6.0	0.08-0.12	0.0-2.9	1.0-2.0	.15	.24			
	30-60	0-0	0.65-1.10	0.6-2.0	0.11-0.18	0.0-2.9	0.0-1.0	.32	.37			
113:												
Lonestar--------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.20	.20	5	2	134
	5-17	0-0	0.65-0.85	0.6-2.0	0.13-0.18	0.0-2.9	5.0-10	.15	.24			
	17-24	0-0	0.80-0.90	0.6-2.0	0.11-0.15	0.0-2.9	3.0-5.0	.15	.24			
	24-30	0-0	0.80-0.90	2.0-6.0	0.08-0.12	0.0-2.9	1.0-2.0	.15	.24			
	30-60	0-0	0.65-1.10	0.6-2.0	0.11-0.18	0.0-2.9	0.0-1.0	.32	.37			
114:												
Lonestar--------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.20	.20	5	2	134
	5-17	0-0	0.65-0.85	0.6-2.0	0.13-0.18	0.0-2.9	5.0-10	.15	.24			
	17-24	0-0	0.80-0.90	0.6-2.0	0.11-0.15	0.0-2.9	3.0-5.0	.15	.24			
	24-30	0-0	0.80-0.90	2.0-6.0	0.08-0.12	0.0-2.9	1.0-2.0	.15	.24			
	30-60	0-0	0.65-1.10	0.6-2.0	0.11-0.18	0.0-2.9	0.0-1.0	.32	.37			
115:												
Lonestar--------------	0-10	0-0	0.65-0.85	2.0-6.0	0.10-0.14	0.0-2.9	6.0-8.0	.28	.28	5	2	134
	10-17	0-0	0.80-0.90	0.6-2.0	0.11-0.15	0.0-2.9	5.0-10	.15	.28			
	17-24	0-0	0.80-0.90	2.0-6.0	0.08-0.12	0.0-2.9	3.0-5.0	.15	.24			
	24-60	0-0	0.65-0.85	0.6-2.0	0.11-0.18	0.0-2.9	1.0-2.0	.32	.37			
116:												
Lonestar--------------	0-10	0-0	0.65-0.85	2.0-6.0	0.10-0.14	0.0-2.9	6.0-8.0	.28	.28	5	2	134
	10-17	0-0	0.80-0.90	0.6-2.0	0.11-0.15	0.0-2.9	5.0-10	.15	.28			
	17-24	0-0	0.80-0.90	2.0-6.0	0.08-0.12	0.0-2.9	3.0-5.0	.15	.24			
	24-60	0-0	0.65-0.85	0.6-2.0	0.11-0.18	0.0-2.9	1.0-2.0	.32	.37			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
117:												
Lonestar--------------	0-10	0-0	0.65-0.85	2.0-6.0	0.10-0.14	0.0-2.9	6.0-8.0	.28	.28	5	2	134
	10-17	0-0	0.80-0.90	0.6-2.0	0.11-0.15	0.0-2.9	5.0-10	.15	.28			
	17-24	0-0	0.80-0.90	2.0-6.0	0.08-0.12	0.0-2.9	3.0-5.0	.15	.24			
	24-60	0-0	0.65-0.85	0.6-2.0	0.11-0.18	0.0-2.9	1.0-2.0	.32	.37			
118:												
Lonestar--------------	0-10	0-0	0.65-0.85	2.0-6.0	0.10-0.14	0.0-2.9	6.0-8.0	.28	.28	4	2	134
	10-17	0-0	0.80-0.90	0.6-2.0	0.11-0.15	0.0-2.9	5.0-10	.15	.28			
	17-24	0-0	0.80-0.90	2.0-6.0	0.08-0.12	0.0-2.9	3.0-5.0	.15	.24			
	24-30	0-0	0.65-0.85	0.6-2.0	0.11-0.18	0.0-2.9	1.0-2.0	.32	.37			
	30-50	0-0	0.75-1.25	0.6-2.0	0.16-0.21	0.0-2.9	0.0-1.0	.32	.37			
	50-54	---	---	---	---	---	---	---	---			
119:												
Loper-----------------	0-12	15-25	0.70-0.90	2.0-6.0	0.15-0.21	0.0-2.9	5.0-15	.24	.24	5	5	56
	12-28	15-25	0.80-1.00	0.6-2.0	0.15-0.21	0.0-2.9	3.0-8.0	.37	.43			
	28-60	35-60	1.10-1.30	0.6-2.0	0.14-0.20	3.0-5.9	0.0-1.0	.24	.28			
120:												
Loper-----------------	0-12	15-25	0.70-0.90	2.0-6.0	0.15-0.21	0.0-2.9	5.0-15	.24	.24	5	5	56
	12-28	15-25	0.80-1.00	0.6-2.0	0.15-0.21	0.0-2.9	3.0-8.0	.37	.43			
	28-60	35-60	1.10-1.30	0.6-2.0	0.14-0.20	3.0-5.9	0.0-1.0	.24	.28			
121:												
Lytell----------------	0-12	0-0	0.60-0.85	0.6-2.0	0.20-0.24	0.0-2.9	10-15	.17	.20	4	5	56
	12-18	0-0	0.65-0.85	0.6-2.0	0.20-0.23	0.0-2.9	1.0-5.0	.17	.24			
	18-55	0-0	0.75-0.90	0.6-2.0	0.19-0.21	0.0-2.9	1.0-3.0	.10	.24			
	55-65	---	---	---	---	---	---	---	---			
122:												
Lytell----------------	0-12	0-0	0.60-0.85	0.6-2.0	0.20-0.24	0.0-2.9	10-15	.17	.20	4	5	56
	12-18	0-0	0.65-0.85	0.6-2.0	0.20-0.23	0.0-2.9	1.0-5.0	.17	.24			
	18-55	0-0	0.75-0.90	0.6-2.0	0.19-0.21	0.0-2.9	1.0-3.0	.10	.24			
	55-65	---	---	---	---	---	---	---	---			
123:												
Mart------------------	0-11	20-27	1.15-1.35	0.6-2.0	0.18-0.21	3.0-5.9	1.0-5.0	.43	.43	4	6	48
	11-20	20-30	1.20-1.40	0.6-2.0	0.18-0.21	3.0-5.9	1.0-2.0	.37	.37			
	20-40	30-40	1.20-1.40	0.2-0.6	0.17-0.20	3.0-5.9	0.0-1.0	.32	.32			
	40-72	25-40	1.20-1.40	0.2-0.6	0.09-0.12	3.0-5.9	0.0-0.5	.10	.32			
124:												
Mart------------------	0-11	20-27	1.15-1.35	0.6-2.0	0.18-0.21	3.0-5.9	1.0-5.0	.43	.43	4	6	48
	11-20	20-30	1.20-1.40	0.6-2.0	0.18-0.21	3.0-5.9	1.0-2.0	.37	.37			
	20-40	30-40	1.20-1.40	0.2-0.6	0.17-0.20	3.0-5.9	0.0-1.0	.32	.32			
	40-72	25-40	1.20-1.40	0.2-0.6	0.09-0.12	3.0-5.9	0.0-0.5	.10	.32			
125:												
Mart------------------	0-11	20-27	1.15-1.35	0.6-2.0	0.18-0.21	3.0-5.9	1.0-5.0	.43	.43	4	6	48
	11-20	20-30	1.20-1.40	0.6-2.0	0.18-0.21	3.0-5.9	1.0-2.0	.37	.37			
	20-40	30-40	1.20-1.40	0.2-0.6	0.17-0.20	3.0-5.9	0.0-1.0	.32	.32			
	40-72	25-40	1.20-1.40	0.2-0.6	0.09-0.12	3.0-5.9	0.0-0.5	.10	.32			
126:												
Mart------------------	0-11	20-27	1.15-1.35	0.6-2.0	0.18-0.21	3.0-5.9	1.0-5.0	.43	.43	4	6	48
	11-20	20-30	1.20-1.40	0.6-2.0	0.18-0.21	3.0-5.9	1.0-2.0	.37	.37			
	20-40	30-40	1.20-1.40	0.2-0.6	0.17-0.20	3.0-5.9	0.0-1.0	.32	.32			
	40-72	25-40	1.20-1.40	0.2-0.6	0.09-0.12	3.0-5.9	0.0-0.5	.10	.32			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
127:												
Maytown---------------	0-18	20-25	1.15-1.35	0.6-2.0	0.19-0.21	0.0-2.9	5.0-10	.43	.43	5	6	48
	18-36	20-35	1.25-1.45	0.6-2.0	0.19-0.21	3.0-5.9	1.0-3.0	.37	.37			
	36-60	20-35	1.25-1.45	0.2-0.6	0.15-0.20	3.0-5.9	0.0-1.0	.37	.37			
128:												
Melbourne-------------	0-10	20-27	1.15-1.35	0.6-2.0	0.18-0.22	0.0-2.9	3.0-8.0	.32	.32	5	6	48
	10-18	27-35	1.10-1.45	0.6-2.0	0.20-0.22	3.0-5.9	1.0-2.0	.24	.24			
	18-35	35-60	1.10-1.40	0.2-0.6	0.16-0.20	3.0-5.9	0.0-1.0	.24	.24			
	35-60	35-60	1.15-1.40	0.2-0.6	0.18-0.22	3.0-5.9	0.0-0.5	.24	.24			
129:												
Melbourne-------------	0-10	20-27	1.15-1.35	0.6-2.0	0.18-0.22	0.0-2.9	3.0-8.0	.32	.32	5	6	48
	10-18	27-35	1.10-1.45	0.6-2.0	0.20-0.22	3.0-5.9	1.0-2.0	.24	.24			
	18-35	35-60	1.10-1.40	0.2-0.6	0.16-0.20	3.0-5.9	0.0-1.0	.24	.24			
	35-60	35-60	1.15-1.40	0.2-0.6	0.18-0.22	3.0-5.9	0.0-0.5	.24	.24			
130:												
Minniece--------------	0-12	18-25	1.10-1.30	0.6-2.0	0.18-0.22	0.0-2.9	6.0-10	.37	.37	5	6	48
	12-42	40-55	1.10-1.30	0.06-0.2	0.06-0.08	6.0-8.9	2.0-6.0	.32	.32			
	42-60	35-55	1.10-1.30	0.06-0.2	0.06-0.10	6.0-8.9	0.5-2.0	.32	.32			
131:												
Mountsolo-------------	0-12	2-5	1.25-1.45	2.0-6.0	0.08-0.12	0.0-2.9	0.0-0.5	.17	.20	2	1	180
	12-48	---	---	---	---	---	---	---	---			
	48-60	---	---	---	---	---	---	---	---			
132:												
Mulholland------------	0-12	15-25	0.85-1.10	0.6-2.0	0.20-0.22	0.0-2.9	5.0-10	.32	.32	5	5	56
	12-52	18-35	0.85-1.10	0.6-2.0	0.19-0.21	0.0-2.9	1.0-2.0	.28	.28			
	52-60	18-35	0.85-1.15	0.6-2.0	0.17-0.20	0.0-2.9	0.0-0.5	.32	.37			
133:												
Murnen----------------	0-13	0-0	0.90-1.00	0.6-2.0	0.20-0.22	0.0-2.9	10-15	.28	.32	5	5	56
	13-60	0-0	0.80-1.00	0.6-2.0	0.19-0.21	0.0-2.9	0.0-3.0	.32	.37			
134:												
Natal-----------------	0-9	27-35	1.10-1.30	0.2-0.6	0.19-0.21	3.0-5.9	1.0-5.0	.32	.32	5	7	38
	9-64	40-60	1.20-1.30	0.06-0.2	0.15-0.17	6.0-8.9	0.0-0.5	.32	.32			
135:												
Newaukum--------------	0-8	0-0	0.65-0.85	0.6-2.0	0.14-0.17	0.0-2.9	5.0-15	.17	.28	4	6	48
	8-41	0-0	0.65-0.85	0.6-2.0	0.12-0.15	0.0-2.9	2.0-5.0	.17	.28			
	41-51	---	---	---	0.07-0.11	---	---	---	---			
136:												
Newaukum--------------	0-8	0-0	0.65-0.85	0.6-2.0	0.14-0.17	0.0-2.9	5.0-15	.17	.28	4	6	48
	8-41	0-0	0.65-0.85	0.6-2.0	0.12-0.15	0.0-2.9	2.0-5.0	.17	.28			
	41-51	---	---	---	0.07-0.11	---	---	---	---			
137:												
Newaukum--------------	0-8	0-0	0.65-0.85	0.6-2.0	0.14-0.17	0.0-2.9	5.0-15	.20	.28	5	6	48
	8-41	0-0	0.65-0.85	0.6-2.0	0.12-0.15	0.0-2.9	0.0-3.0	.17	.28			
	41-60	0-0	0.65-1.10	0.6-2.0	0.07-0.11	0.0-2.9	0.0-0.5	.10	.32			
138:												
Newaukum--------------	0-8	0-0	0.65-0.85	0.6-2.0	0.14-0.17	0.0-2.9	5.0-15	.20	.28	5	6	48
	8-41	0-0	0.65-0.85	0.6-2.0	0.12-0.15	0.0-2.9	0.0-3.0	.17	.28			
	41-60	0-0	0.65-1.10	0.6-2.0	0.07-0.11	0.0-2.9	0.0-0.5	.10	.32			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (K_{sat})	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
139:												
Newaukum--------------	0-8	0-0	0.65-0.85	0.6-2.0	0.14-0.17	0.0-2.9	5.0-15	.20	.28	5	6	48
	8-41	0-0	0.65-0.85	0.6-2.0	0.12-0.15	0.0-2.9	0.0-3.0	.17	.28			
	41-60	0-0	0.65-1.10	0.6-2.0	0.07-0.11	0.0-2.9	0.0-0.5	.10	.32			
140:												
Newaukum--------------	0-8	0-0	0.65-0.85	0.6-2.0	0.14-0.17	0.0-2.9	5.0-15	.20	.28	5	6	48
	8-41	0-0	0.65-0.85	0.6-2.0	0.12-0.15	0.0-2.9	0.0-3.0	.17	.28			
	41-60	0-0	0.65-1.10	0.6-2.0	0.07-0.11	0.0-2.9	0.0-0.5	.10	.32			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
141:												
Newberg---------------	0-10	7-15	1.20-1.40	2.0-6.0	0.12-0.15	0.0-2.9	5.0-10	.28	.28	5	3	86
	10-28	5-10	1.20-1.40	2.0-6.0	0.12-0.17	0.0-2.9	0.5-1.0	.37	.37			
	28-60	3-10	1.20-1.40	6.0-20.0	0.09-0.13	0.0-2.9	0.0-0.5	.20	.24			
142:												
Olequa----------------	0-8	10-20	1.15-1.30	0.6-2.0	0.19-0.21	0.0-2.9	3.0-8.0	.32	.32	5	5	56
	8-20	10-20	1.30-1.50	0.6-2.0	0.19-0.21	0.0-2.9	1.0-3.0	.32	.32			
	20-60	20-35	1.20-1.40	0.6-2.0	0.19-0.21	3.0-5.9	0.0-1.0	.37	.37			
143:												
Olequa----------------	0-8	10-20	1.15-1.30	0.6-2.0	0.19-0.21	0.0-2.9	3.0-8.0	.32	.32	5	5	56
	8-20	10-20	1.30-1.50	0.6-2.0	0.19-0.21	0.0-2.9	1.0-3.0	.32	.32			
	20-60	20-35	1.20-1.40	0.6-2.0	0.19-0.21	3.0-5.9	0.0-1.0	.37	.37			
144:												
Olequa----------------	0-8	10-20	1.15-1.30	0.6-2.0	0.19-0.21	0.0-2.9	3.0-8.0	.32	.32	5	5	56
	8-20	10-20	1.30-1.50	0.6-2.0	0.19-0.21	0.0-2.9	1.0-3.0	.32	.32			
	20-60	20-35	1.20-1.40	0.6-2.0	0.19-0.21	3.0-5.9	0.0-1.0	.37	.37			
145:												
Olequa----------------	0-8	10-20	1.15-1.30	0.6-2.0	0.19-0.21	0.0-2.9	3.0-8.0	.32	.32	5	5	56
	8-20	10-20	1.30-1.50	0.6-2.0	0.19-0.21	0.0-2.9	1.0-3.0	.32	.32			
	20-60	20-35	1.20-1.40	0.6-2.0	0.19-0.21	3.0-5.9	0.0-1.0	.37	.37			
146:												
Olympic---------------	0-4	15-27	1.15-1.35	0.6-2.0	0.20-0.22	0.0-2.9	3.0-8.0	.32	.32	5	5	56
	4-14	25-35	1.10-1.40	0.6-2.0	0.11-0.20	3.0-5.9	1.0-3.0	.24	.24			
	14-38	35-60	1.10-1.35	0.6-2.0	0.15-0.19	3.0-5.9	0.0-1.0	.20	.20			
	38-60	40-70	1.00-1.35	0.6-2.0	0.15-0.20	3.0-5.9	0.0-0.5	.20	.20			
147:												
Olympic---------------	0-4	15-27	1.15-1.35	0.6-2.0	0.20-0.22	0.0-2.9	3.0-8.0	.32	.32	5	5	56
	4-14	25-35	1.10-1.40	0.6-2.0	0.11-0.20	3.0-5.9	1.0-3.0	.24	.24			
	14-38	35-60	1.10-1.35	0.6-2.0	0.15-0.19	3.0-5.9	0.0-1.0	.20	.20			
	38-60	40-70	1.00-1.35	0.6-2.0	0.15-0.20	3.0-5.9	0.0-0.5	.20	.20			
148:												
Olympic---------------	0-4	15-27	1.15-1.35	0.6-2.0	0.20-0.22	0.0-2.9	3.0-8.0	.32	.32	5	5	56
	4-14	25-35	1.10-1.40	0.6-2.0	0.11-0.20	3.0-5.9	1.0-3.0	.24	.24			
	14-38	35-60	1.10-1.35	0.6-2.0	0.15-0.19	3.0-5.9	0.0-1.0	.20	.20			
	38-60	40-70	1.00-1.35	0.6-2.0	0.15-0.20	3.0-5.9	0.0-0.5	.20	.20			
149:												
Olympic---------------	0-4	15-27	1.15-1.35	0.6-2.0	0.20-0.22	0.0-2.9	3.0-8.0	.32	.32	5	5	56
	4-14	25-35	1.10-1.40	0.6-2.0	0.11-0.20	3.0-5.9	1.0-3.0	.24	.24			
	14-38	35-60	1.10-1.35	0.6-2.0	0.15-0.19	3.0-5.9	0.0-1.0	.20	.20			
	38-60	40-70	1.00-1.35	0.6-2.0	0.15-0.20	3.0-5.9	0.0-0.5	.20	.20			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
150:												
Olympic	0-8	15-27	1.15-1.35	0.6-2.0	0.20-0.22	0.0-2.9	3.0-8.0	.32	.32	4	5	56
	8-24	25-35	1.10-1.40	0.6-2.0	0.11-0.20	3.0-5.9	1.0-3.0	.24	.24			
	24-50	35-60	1.10-1.35	0.6-2.0	0.15-0.19	3.0-5.9	0.0-1.0	.20	.20			
	50-60	---	---	---	0.15-0.20	3.0-5.9	---	.20	.20			
151:												
Panamaker	0-3	0-5	1.35-1.55	6.0-20.0	0.05-0.07	0.0-2.9	0.0-0.5	.05	.17	5	1	180
	3-60	0-5	1.40-1.60	6.0-20.0	0.05-0.07	0.0-2.9	0.0-0.5	.10	.20			
152:												
Panamaker	0-6	0-5	1.35-1.55	6.0-20.0	0.05-0.08	0.0-2.9	0.0-0.5	.05	.17	5	1	180
	6-60	0-5	1.40-1.60	6.0-20.0	0.06-0.08	0.0-2.9	0.0-0.5	.10	.10			
153:												
Pheeney	0-7	0-0	0.60-0.85	0.6-2.0	0.20-0.30	0.0-2.9	5.0-10	.17	.28	2	6	48
	7-15	0-0	0.85-0.95	0.6-2.0	0.20-0.30	0.0-2.9	3.0-5.0	.10	.28			
	15-36	0-0	0.90-1.00	0.6-2.0	0.08-0.15	0.0-2.9	1.0-3.0	.05	.32			
	36-40	---	---	---	---	---	---	---	---			
154:												
Pheeney	0-7	0-0	0.60-0.85	0.6-2.0	0.20-0.30	0.0-2.9	5.0-10	.17	.28	2	6	48
	7-15	0-0	0.85-0.95	0.6-2.0	0.20-0.30	0.0-2.9	3.0-5.0	.10	.28			
	15-36	0-0	0.90-1.00	0.6-2.0	0.08-0.15	0.0-2.9	1.0-3.0	.05	.32			
	36-40	---	---	---	---	---	---	---	---			
155:												
Pheeney	0-7	0-0	0.60-0.85	0.6-2.0	0.20-0.30	0.0-2.9	5.0-10	.17	.28	2	6	48
	7-15	0-0	0.85-0.95	0.6-2.0	0.20-0.30	0.0-2.9	3.0-5.0	.10	.28			
	15-36	0-0	0.90-1.00	0.6-2.0	0.08-0.15	0.0-2.9	1.0-3.0	.05	.32			
	36-40	---	---	---	---	---	---	---	---			
156:												
Pheeney	0-7	0-0	0.60-0.85	0.6-2.0	0.20-0.30	0.0-2.9	5.0-10	.17	.28	2	6	48
	7-15	0-0	0.85-0.95	0.6-2.0	0.20-0.30	0.0-2.9	3.0-5.0	.10	.28			
	15-36	0-0	0.90-1.00	0.6-2.0	0.08-0.15	0.0-2.9	1.0-3.0	.05	.32			
	36-40	---	---	---	---	---	---	---	---			
Beigle	0-13	0-0	0.80-0.90	0.6-2.0	0.18-0.24	0.0-2.9	5.0-10	.32	.43	3	5	56
	13-42	0-0	0.80-0.90	0.6-2.0	0.15-0.20	0.0-2.9	2.0-4.0	.32	.43			
	42-46	0-0	0.90-1.30	0.6-2.0	0.10-0.15	0.0-2.9	0.0-1.0	.32	.43			
	46-50	---	---	---	---	---	---	---	---			
157:												
Pheeney	0-7	0-0	0.60-0.85	0.6-2.0	0.20-0.30	0.0-2.9	5.0-10	.17	.28	2	6	48
	7-15	0-0	0.85-0.95	0.6-2.0	0.20-0.30	0.0-2.9	3.0-5.0	.10	.28			
	15-36	0-0	0.90-1.00	0.6-2.0	0.08-0.15	0.0-2.9	1.0-3.0	.05	.32			
	36-40	---	---	---	---	---	---	---	---			
Beigle	0-13	0-0	0.80-0.90	0.6-2.0	0.18-0.24	0.0-2.9	5.0-10	.32	.43	3	5	56
	13-42	0-0	0.80-0.90	0.6-2.0	0.15-0.20	0.0-2.9	2.0-4.0	.32	.43			
	42-46	0-0	0.90-1.30	0.6-2.0	0.10-0.15	0.0-2.9	0.0-1.0	.32	.43			
	46-50	---	---	---	---	---	---	---	---			
158:												
Pheeney	0-7	0-0	0.60-0.85	0.6-2.0	0.20-0.30	0.0-2.9	5.0-10	.17	.28	2	6	48
	7-15	0-0	0.85-0.95	0.6-2.0	0.20-0.30	0.0-2.9	3.0-5.0	.10	.28			
	15-36	0-0	0.90-1.00	0.6-2.0	0.08-0.15	0.0-2.9	1.0-3.0	.05	.32			
	36-40	---	---	---	---	---	---	---	---			
Rock outcrop	0-60	---	---	---	---	---	---	---	---	---	8	0

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
159:												
Pheeney---------------	0-7	0-0	0.60-0.85	0.6-2.0	0.20-0.30	0.0-2.9	5.0-10	.17	.28	2	6	48
	7-15	0-0	0.85-0.95	0.6-2.0	0.20-0.30	0.0-2.9	3.0-5.0	.10	.28			
	15-36	0-0	0.90-1.00	0.6-2.0	0.08-0.15	0.0-2.9	1.0-3.0	.05	.32			
	36-40	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
160:												
Pilchuck--------------	0-12	0-5	1.50-1.60	6.0-20.0	0.06-0.08	0.0-2.9	1.0-2.0	.20	.28	4	2	134
	12-36	0-5	1.50-1.60	6.0-20.0	0.06-0.08	0.0-2.9	0.0-1.0	.10	.10			
	36-60	0-5	1.60-1.65	20.0-20.0	0.03-0.05	0.0-2.9	0.0-0.5	.05	.20			
161:												
Pits------------------	0-6	0-0	1.35-1.50	6.0-20.0	0.01-0.02	0.0-2.9	0.0-0.1	.02	.17	---	4	86
	6-60	0-0	1.40-1.60	6.0-20.0	0.01-0.02	0.0-2.9	0.0-0.5	.02	.17			
162:												
Polepatch-------------	0-7	0-2	1.30-1.50	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	7-12	0-0	1.30-1.45	6.0-20.0	0.03-0.05	0.0-2.9	0.0-1.0	.10	.20			
	12-60	0-2	1.40-1.60	6.0-20.0	0.04-0.08	0.0-2.9	0.0-1.0	.02	.24			
163:												
Polepatch-------------	0-5	0-0	1.30-1.45	2.0-6.0	0.06-0.08	0.0-2.9	1.0-2.0	.05	.17	5	3	86
	5-60	0-2	1.40-1.60	6.0-20.0	0.03-0.05	0.0-2.9	0.0-1.0	.02	.17			
164:												
Polepatch-------------	0-5	0-0	1.30-1.45	2.0-6.0	0.06-0.08	0.0-2.9	1.0-2.0	.05	.17	5	3	86
	5-60	0-2	1.40-1.60	6.0-20.0	0.03-0.05	0.0-2.9	0.0-1.0	.02	.17			
165:												
Polepatch-------------	0-5	0-0	1.30-1.45	6.0-20.0	0.03-0.05	0.0-2.9	1.0-2.0	.10	.17	5	5	56
	5-60	0-2	1.40-1.60	6.0-20.0	0.03-0.05	0.0-2.9	0.0-1.0	.02	.17			
166:												
Prather---------------	0-13	27-35	1.10-1.30	0.6-2.0	0.16-0.19	0.0-2.9	2.0-6.0	.28	.28	4	7	38
	13-43	35-60	1.15-1.35	0.6-2.0	0.13-0.15	0.0-2.9	1.0-2.0	.24	.24			
	43-60	35-65	1.20-1.45	0.06-0.2	0.13-0.15	3.0-5.9	0.0-1.0	.24	.24			
167:												
Prather---------------	0-13	27-35	1.10-1.30	0.6-2.0	0.16-0.19	0.0-2.9	2.0-6.0	.28	.28	4	7	38
	13-43	35-60	1.15-1.35	0.6-2.0	0.13-0.15	0.0-2.9	1.0-2.0	.24	.24			
	43-60	35-65	1.20-1.45	0.06-0.2	0.13-0.15	3.0-5.9	0.0-1.0	.24	.24			
168:												
Raught----------------	0-11	18-27	0.75-0.95	2.0-6.0	0.19-0.21	0.0-2.9	4.0-10	.32	.32	5	6	48
	11-60	25-40	1.15-1.30	0.6-2.0	0.19-0.21	0.0-2.9	1.0-2.0	.28	.32			
169:												
Raught----------------	0-11	18-27	0.75-0.95	2.0-6.0	0.19-0.21	0.0-2.9	4.0-10	.32	.32	5	6	48
	11-60	25-40	1.15-1.30	0.6-2.0	0.19-0.21	0.0-2.9	1.0-2.0	.28	.32			
170:												
Raught----------------	0-11	18-27	0.75-0.95	2.0-6.0	0.19-0.21	0.0-2.9	4.0-10	.32	.32	5	6	48
	11-60	25-40	1.15-1.30	0.6-2.0	0.19-0.21	0.0-2.9	1.0-2.0	.28	.32			
171:												
Reichel---------------	0-19	0-0	0.85-1.00	0.6-2.0	0.25-0.35	0.0-2.9	10-15	.32	.37	3	5	56
	19-47	0-0	0.90-1.10	0.6-2.0	0.20-0.30	3.0-5.9	1.0-2.0	.20	.32			
	47-53	0-0	0.90-1.20	0.6-2.0	0.10-0.15	0.0-2.9	0.5-1.0	.10	.32			
	53-57	---	---	---	---	---	---	---	---			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
172:												
Riverwash-------------	0-6	0-2	1.35-1.50	6.0-20.0	0.03-0.04	0.0-2.9	0.0-0.1	.10	.15	---	1	180
	6-60	0-2	1.40-1.65	6.0-20.0	0.02-0.03	0.0-2.9	0.0-0.1	.05	.17			
173:												
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
Rubble land-----------	0-60	0-0	2.00-2.35	20.0-20.0	0.00-0.10	0.0-2.9	0.0-0.1	---	---	---	8	0
174:												
Rose Valley-----------	0-11	18-25	1.10-1.30	0.6-2.0	0.18-0.22	0.0-2.9	2.0-8.0	.37	.37	4	6	48
	11-51	18-35	1.25-1.50	0.2-0.6	0.15-0.19	3.0-5.9	0.0-1.0	.28	.28			
	51-75	35-65	1.25-1.60	0.01-0.06	0.14-0.17	6.0-8.9	0.0-1.0	.20	.20			
175:												
Rose Valley-----------	0-11	18-25	1.10-1.30	0.6-2.0	0.18-0.22	0.0-2.9	2.0-8.0	.37	.37	4	6	48
	11-51	18-35	1.25-1.50	0.2-0.6	0.15-0.19	3.0-5.9	0.0-1.0	.28	.28			
	51-75	35-65	1.25-1.60	0.01-0.06	0.14-0.17	6.0-8.9	0.0-1.0	.20	.20			
176:												
Salkum----------------	0-12	20-27	1.00-1.35	0.6-2.0	0.22-0.24	0.0-2.9	2.0-6.0	.32	.32	5	6	48
	12-45	35-55	1.30-1.50	0.6-2.0	0.13-0.16	0.0-2.9	0.5-2.0	.24	.24			
	45-60	35-50	1.00-1.50	0.2-0.6	0.15-0.17	0.0-2.9	0.0-0.5	.24	.24			
177:												
Salkum----------------	0-12	20-27	1.00-1.35	0.6-2.0	0.22-0.24	0.0-2.9	2.0-6.0	.32	.32	5	6	48
	12-45	35-55	1.30-1.50	0.6-2.0	0.13-0.16	0.0-2.9	0.5-2.0	.24	.24			
	45-60	35-50	1.00-1.50	0.2-0.6	0.15-0.17	0.0-2.9	0.0-0.5	.24	.24			
178:												
Salkum----------------	0-12	20-27	1.00-1.35	0.6-2.0	0.22-0.24	0.0-2.9	2.0-6.0	.32	.32	5	6	48
	12-45	35-55	1.30-1.50	0.6-2.0	0.13-0.16	0.0-2.9	0.5-2.0	.24	.24			
	45-60	35-50	1.00-1.50	0.2-0.6	0.15-0.17	0.0-2.9	0.0-0.5	.24	.24			
179:												
Sara------------------	0-11	15-20	1.15-1.35	0.6-2.0	0.16-0.19	0.0-2.9	2.0-5.0	.32	.32	5	5	56
	11-35	27-40	1.20-1.40	0.6-2.0	0.16-0.19	3.0-5.9	1.0-2.0	.32	.32			
	35-60	35-60	1.15-1.35	0.2-0.6	0.16-0.19	6.0-8.9	0.5-1.0	.28	.28			
180:												
Sara------------------	0-11	15-20	1.15-1.35	0.6-2.0	0.16-0.19	0.0-2.9	2.0-5.0	.32	.32	5	5	56
	11-35	27-40	1.20-1.40	0.6-2.0	0.16-0.19	3.0-5.9	1.0-2.0	.32	.32			
	35-60	35-60	1.15-1.35	0.2-0.6	0.16-0.19	6.0-8.9	0.5-1.0	.28	.28			
181:												
Sara------------------	0-11	15-20	1.15-1.35	0.6-2.0	0.16-0.19	0.0-2.9	2.0-5.0	.32	.32	5	5	56
	11-35	27-40	1.20-1.40	0.6-2.0	0.16-0.19	3.0-5.9	1.0-2.0	.32	.32			
	35-60	35-60	1.15-1.35	0.2-0.6	0.16-0.19	6.0-8.9	0.5-1.0	.28	.28			
182:												
Sara------------------	0-11	28-35	1.05-1.25	0.6-2.0	0.16-0.19	3.0-5.9	2.0-5.0	.28	.28	5	7	38
	11-35	27-40	1.20-1.40	0.6-2.0	0.16-0.19	3.0-5.9	1.0-2.0	.32	.32			
	35-60	35-60	1.15-1.35	0.2-0.6	0.16-0.19	6.0-8.9	0.5-1.0	.28	.28			
183:												
Sarazan---------------	0-9	0-0	0.65-0.85	0.6-2.0	0.09-0.13	0.0-2.9	5.0-10	.15	.28	4	7	38
	9-31	0-0	1.00-1.20	0.6-2.0	0.08-0.11	0.0-2.9	1.0-3.0	.15	.28			
	31-50	0-0	1.00-1.20	0.6-2.0	0.07-0.10	0.0-2.9	0.0-1.0	.10	.32			
	50-60	---	---	---	---	---	---	---	---			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
184:												
Sarazan---------------	0-9	0-0	0.65-0.85	0.6-2.0	0.09-0.13	0.0-2.9	5.0-10	.15	.28	4	7	38
	9-31	0-0	1.00-1.20	0.6-2.0	0.08-0.11	0.0-2.9	1.0-3.0	.15	.28			
	31-50	0-0	1.00-1.20	0.6-2.0	0.07-0.10	0.0-2.9	0.0-1.0	.10	.32			
	50-60	---	---	---	---	---	---	---	---			
185:												
Sauvola---------------	0-15	18-27	1.15-1.30	0.6-2.0	0.19-0.22	0.0-2.9	2.0-6.0	.32	.32	5	6	48
	15-27	18-40	1.15-1.35	0.6-2.0	0.18-0.20	0.0-2.9	1.0-2.0	.32	.32			
	27-51	35-60	1.20-1.40	0.2-0.6	0.15-0.19	3.0-5.9	0.0-1.0	.24	.24			
	51-60	27-60	1.20-1.55	0.2-0.6	0.15-0.19	3.0-5.9	0.0-0.5	.24	.24			
186:												
Sauvola---------------	0-15	18-27	1.15-1.30	0.6-2.0	0.19-0.22	0.0-2.9	2.0-6.0	.32	.32	5	6	48
	15-27	18-40	1.15-1.35	0.6-2.0	0.18-0.20	0.0-2.9	1.0-2.0	.32	.32			
	27-51	35-60	1.20-1.40	0.2-0.6	0.15-0.19	3.0-5.9	0.0-1.0	.24	.24			
	51-60	27-60	1.20-1.55	0.2-0.6	0.15-0.19	3.0-5.9	0.0-0.5	.24	.24			
187:												
Sauvola---------------	0-15	18-27	1.15-1.30	0.6-2.0	0.19-0.22	0.0-2.9	2.0-6.0	.32	.32	5	6	48
	15-27	18-40	1.15-1.35	0.6-2.0	0.18-0.20	0.0-2.9	1.0-2.0	.32	.32			
	27-51	35-60	1.20-1.40	0.2-0.6	0.15-0.19	3.0-5.9	0.0-1.0	.24	.24			
	51-60	27-60	1.20-1.55	0.2-0.6	0.15-0.19	3.0-5.9	0.0-0.5	.24	.24			
188:												
Schneider-------------	0-12	18-25	0.65-0.95	0.6-2.0	0.08-0.13	0.0-2.9	5.0-10	.10	.32	3	7	38
	12-28	18-25	0.95-1.25	0.6-2.0	0.07-0.10	0.0-2.9	1.0-3.0	.10	.32			
	28-45	18-25	1.00-1.20	0.6-2.0	0.05-0.08	0.0-2.9	0.5-1.0	.10	.32			
	45-49	---	---	---	---	---	---	---	---			
189:												
Schneider-------------	0-12	18-25	0.65-0.95	0.6-2.0	0.08-0.13	0.0-2.9	5.0-10	.10	.32	3	7	38
	12-28	18-25	0.95-1.25	0.6-2.0	0.07-0.10	0.0-2.9	1.0-3.0	.10	.32			
	28-45	18-25	1.00-1.20	0.6-2.0	0.05-0.08	0.0-2.9	0.5-1.0	.10	.32			
	45-49	---	---	---	---	---	---	---	---			
190:												
Schneider-------------	0-12	18-25	0.65-0.95	0.6-2.0	0.08-0.13	0.0-2.9	5.0-10	.10	.32	3	7	38
	12-28	18-25	0.95-1.25	0.6-2.0	0.07-0.10	0.0-2.9	1.0-3.0	.10	.32			
	28-45	18-25	1.00-1.20	0.6-2.0	0.05-0.08	0.0-2.9	0.5-1.0	.10	.32			
	45-49	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
191:												
Schneider-------------	0-12	18-25	0.65-0.95	0.6-2.0	0.08-0.13	0.0-2.9	5.0-10	.10	.32	3	7	38
	12-28	18-25	0.95-1.25	0.6-2.0	0.07-0.10	0.0-2.9	1.0-3.0	.10	.32			
	28-45	18-25	1.00-1.20	0.6-2.0	0.05-0.08	0.0-2.9	0.5-1.0	.10	.32			
	45-49	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
192:												
Seaquest--------------	0-6	18-27	1.15-1.50	0.6-2.0	0.18-0.21	3.0-5.9	3.0-5.0	.32	.32	3	6	48
	6-60	35-60	1.20-1.50	0.2-0.6	0.17-0.20	3.0-5.9	0.0-1.0	.28	.28			
193:												
Seaquest--------------	0-6	18-27	1.15-1.50	0.6-2.0	0.18-0.21	3.0-5.9	3.0-5.0	.32	.32	3	6	48
	6-60	35-60	1.20-1.50	0.2-0.6	0.17-0.20	3.0-5.9	0.0-1.0	.28	.28			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
194:												
Seaquest--------------	0-6	18-27	1.15-1.50	0.6-2.0	0.18-0.21	3.0-5.9	3.0-5.0	.32	.32	3	6	48
	6-60	35-60	1.20-1.50	0.2-0.6	0.17-0.20	3.0-5.9	0.0-1.0	.28	.28			
195:												
Semiahmoo-------------	0-15	0-0	0.25-0.60	0.6-2.0	0.25-0.30	0.0-2.9	30-60	---	---	3	8	0
	15-46	0-0	0.25-0.60	0.6-2.0	0.25-0.30	0.0-2.9	30-60	---	---			
	46-60	5-45	1.00-1.35	0.2-0.6	0.10-0.20	0.0-2.9	2.0-5.0	.32	.37			
196:												
Siouxon---------------	0-14	0-0	0.85-1.00	0.6-2.0	0.07-0.11	0.0-2.9	5.0-10	.17	.28	4	7	38
	14-28	0-0	1.00-1.20	0.6-2.0	0.05-0.09	0.0-2.9	1.0-2.0	.10	.28			
	28-55	0-0	1.00-1.20	0.6-2.0	0.03-0.05	0.0-2.9	0.0-1.0	.05	.28			
	55-59	---	---	---	---	---	---	---	---			
197:												
Siouxon---------------	0-14	0-0	0.85-1.00	0.6-2.0	0.07-0.11	0.0-2.9	5.0-10	.17	.28	4	7	38
	14-28	0-0	1.00-1.20	0.6-2.0	0.05-0.09	0.0-2.9	1.0-2.0	.10	.28			
	28-55	0-0	1.00-1.20	0.6-2.0	0.03-0.05	0.0-2.9	0.0-1.0	.05	.28			
	55-59	---	---	---	---	---	---	---	---			
198:												
Siouxon---------------	0-14	0-0	0.85-1.00	0.6-2.0	0.07-0.11	0.0-2.9	5.0-10	.17	.28	4	7	38
	14-28	0-0	1.00-1.20	0.6-2.0	0.05-0.09	0.0-2.9	1.0-2.0	.10	.28			
	28-55	0-0	1.00-1.20	0.6-2.0	0.03-0.05	0.0-2.9	0.0-1.0	.05	.28			
	55-59	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
199:												
Snohomish-------------	0-7	27-35	1.00-1.25	0.06-0.2	0.19-0.21	3.0-5.9	10-20	.32	.32	5	7	38
	7-18	18-35	1.00-1.40	0.2-0.6	0.19-0.21	3.0-5.9	2.0-5.0	.37	.37			
	18-60	0-0	0.25-0.60	0.6-2.0	0.30-0.40	0.0-2.9	20-60	.15	---			
200:												
Solo------------------	0-2	0-5	1.20-1.40	6.0-20.0	0.04-0.08	0.0-2.9	0.5-1.0	.15	.17	3	2	134
	2-20	0-5	1.30-1.50	6.0-20.0	0.04-0.08	0.0-2.9	0.0-0.5	.15	.20			
	20-32	0-5	1.40-1.60	6.0-20.0	0.02-0.05	0.0-2.9	0.0-0.5	.05	.20			
	32-60	---	---	---	---	---	---	---	---			
201:												
Speelyai--------------	0-5	0-5	1.30-1.50	6.0-20.0	0.04-0.08	0.0-2.9	0.5-1.0	.15	.24	2	2	134
	5-11	0-5	1.45-1.60	6.0-20.0	0.02-0.05	0.0-2.9	0.0-0.5	.05	.20			
	11-60	---	---	---	---	---	---	---	---			
202:												
Speelyai--------------	0-5	0-5	1.30-1.50	6.0-20.0	0.04-0.08	0.0-2.9	0.5-1.0	.15	.24	2	2	134
	5-11	0-5	1.45-1.60	6.0-20.0	0.02-0.05	0.0-2.9	0.0-0.5	.05	.20			
	11-60	---	---	---	---	---	---	---	---			
203:												
Spodic Cryopsamments--	0-12	1-5	1.15-1.30	6.0-20.0	0.06-0.08	0.0-2.9	6.0-8.0	.17	.20	3	2	134
	12-55	1-5	1.30-1.50	6.0-20.0	0.05-0.07	0.0-2.9	1.0-2.0	.10	.10			
	55-60	2-5	1.35-1.55	2.0-6.0	0.08-0.11	0.0-2.9	0.0-1.0	.20	.20			
204:												
Stahl-----------------	0-7	0-0	0.65-0.85	0.6-2.0	0.10-0.15	0.0-2.9	10-15	.10	.28	2	7	38
	7-11	0-0	0.90-1.00	0.6-2.0	0.10-0.15	0.0-2.9	3.0-5.0	.05	.28			
	11-36	0-0	0.90-1.10	0.6-2.0	0.05-0.10	0.0-2.9	1.0-3.0	.05	.32			
	36-40	---	---	---	---	---	---	---	---			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
205:												
Stahl-----------------	0-7	0-0	0.65-0.85	0.6-2.0	0.10-0.15	0.0-2.9	10-15	.10	.28	2	7	38
	7-11	0-0	0.90-1.00	0.6-2.0	0.10-0.15	0.0-2.9	3.0-5.0	.05	.28			
	11-36	0-0	0.90-1.10	0.6-2.0	0.05-0.10	0.0-2.9	1.0-3.0	.05	.32			
	36-40	---	---	---	---	---	---	---	---			
Reichel---------------	0-19	0-0	0.85-1.00	0.6-2.0	0.25-0.35	0.0-2.9	10-15	.32	.37	3	5	56
	19-47	0-0	0.90-1.10	0.6-2.0	0.20-0.30	3.0-5.9	1.0-2.0	.20	.32			
	47-53	0-0	0.90-1.20	0.6-2.0	0.10-0.15	0.0-2.9	0.5-1.0	.10	.32			
	53-57	---	---	---	---	---	---	---	---			
206:												
Stahl-----------------	0-7	0-0	0.65-0.85	0.6-2.0	0.10-0.15	0.0-2.9	10-15	.10	.28	2	7	38
	7-11	0-0	0.90-1.00	0.6-2.0	0.10-0.15	0.0-2.9	3.0-5.0	.05	.28			
	11-36	0-0	0.90-1.10	0.6-2.0	0.05-0.10	0.0-2.9	1.0-3.0	.05	.32			
	36-40	---	---	---	---	---	---	---	---			
Reichel---------------	0-19	0-0	0.85-1.00	0.6-2.0	0.25-0.35	0.0-2.9	10-15	.32	.37	3	5	56
	19-47	0-0	0.90-1.10	0.6-2.0	0.20-0.30	3.0-5.9	1.0-2.0	.20	.32			
	47-53	0-0	0.90-1.20	0.6-2.0	0.10-0.15	0.0-2.9	0.5-1.0	.10	.32			
	53-57	---	---	---	---	---	---	---	---			
207:												
Stahl-----------------	0-7	0-0	0.65-0.85	0.6-2.0	0.10-0.15	0.0-2.9	10-15	.10	.28	2	7	38
	7-11	0-0	0.90-1.00	0.6-2.0	0.10-0.15	0.0-2.9	3.0-5.0	.05	.28			
	11-36	0-0	0.90-1.10	0.6-2.0	0.05-0.10	0.0-2.9	1.0-3.0	.05	.32			
	36-40	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
208:												
Stella----------------	0-11	15-27	1.15-1.35	0.6-2.0	0.19-0.21	0.0-2.9	1.0-5.0	.37	.37	5	5	56
	11-25	20-27	1.30-1.45	0.6-2.0	0.18-0.20	0.0-2.9	1.0-2.0	.37	.37			
	25-48	20-35	1.20-1.30	0.2-0.6	0.18-0.20	3.0-5.9	0.0-1.0	.32	.32			
	48-60	30-60	1.15-1.35	0.01-0.2	0.17-0.19	3.0-5.9	0.0-0.5	.24	.24			
209:												
Stella----------------	0-11	15-27	1.15-1.35	0.6-2.0	0.19-0.21	0.0-2.9	1.0-5.0	.37	.37	5	5	56
	11-25	20-27	1.30-1.45	0.6-2.0	0.18-0.20	0.0-2.9	1.0-2.0	.37	.37			
	25-48	20-35	1.20-1.30	0.2-0.6	0.18-0.20	3.0-5.9	0.0-1.0	.32	.32			
	48-60	30-60	1.15-1.35	0.01-0.2	0.17-0.19	3.0-5.9	0.0-0.5	.24	.24			
210:												
Stella----------------	0-11	15-27	1.15-1.35	0.6-2.0	0.19-0.21	0.0-2.9	1.0-5.0	.37	.37	5	5	56
	11-25	20-27	1.30-1.45	0.6-2.0	0.18-0.20	0.0-2.9	1.0-2.0	.37	.37			
	25-48	20-35	1.20-1.30	0.2-0.6	0.18-0.20	3.0-5.9	0.0-1.0	.32	.32			
	48-60	30-60	1.15-1.35	0.01-0.2	0.17-0.19	3.0-5.9	0.0-0.5	.24	.24			
211:												
Studebaker------------	0-8	0-2	1.40-1.60	2.0-6.0	0.03-0.05	0.0-2.9	0.0-0.5	.05	.17	5	3	86
	8-60	0-2	1.40-1.70	2.0-6.0	0.03-0.05	0.0-2.9	0.0-0.5	.05	.20			
212:												
Swem------------------	0-12	0-0	0.65-0.95	0.6-2.0	0.11-0.13	0.0-2.9	5.0-15	.15	.28	5	6	48
	12-32	0-0	1.00-1.20	0.6-2.0	0.11-0.13	0.0-2.9	1.0-5.0	.15	.28			
	32-60	0-0	1.00-1.20	0.2-0.6	0.19-0.21	0.0-2.9	0.0-1.0	.28	.32			
213:												
Swem------------------	0-12	0-0	0.65-0.95	0.6-2.0	0.11-0.13	0.0-2.9	5.0-15	.15	.28	5	6	48
	12-32	0-0	1.00-1.20	0.6-2.0	0.11-0.13	0.0-2.9	1.0-5.0	.15	.28			
	32-60	0-0	1.00-1.20	0.2-0.6	0.19-0.21	0.0-2.9	0.0-1.0	.28	.32			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
214:												
Swift-----------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	5	2	134
	5-9	0-0	0.65-0.85	0.6-2.0	0.11-0.13	0.0-2.9	3.0-5.0	.28	.28			
	9-17	0-0	0.65-0.85	0.6-2.0	0.11-0.13	0.0-2.9	1.0-3.0	.17	.28			
	17-29	0-0	0.65-0.85	0.6-2.0	0.06-0.08	0.0-2.9	0.0-1.0	.20	.32			
	29-60	15-30	0.75-1.10	0.6-2.0	0.10-0.12	0.0-2.9	0.0-0.5	.10	.32			
215:												
Swift-----------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	5	2	134
	5-9	0-0	0.65-0.85	0.6-2.0	0.11-0.13	0.0-2.9	3.0-5.0	.28	.28			
	9-17	0-0	0.65-0.85	0.6-2.0	0.11-0.13	0.0-2.9	1.0-3.0	.17	.28			
	17-29	0-0	0.65-0.85	0.6-2.0	0.06-0.08	0.0-2.9	0.0-1.0	.20	.32			
	29-60	15-30	0.75-1.10	0.6-2.0	0.10-0.12	0.0-2.9	0.0-0.5	.10	.32			
216:												
Swift-----------------	0-4	2-5	0.95-1.30	0.6-2.0	0.11-0.15	0.0-2.9	0.0-0.5	.17	.24	5	2	134
	4-24	0-0	0.65-0.85	0.6-2.0	0.11-0.13	0.0-2.9	1.0-3.0	.17	.28			
	24-60	15-30	0.75-1.10	0.6-2.0	0.10-0.12	0.0-2.9	0.0-0.5	.10	.32			
217:												
Swift-----------------	0-4	2-5	0.95-1.30	0.6-2.0	0.11-0.15	0.0-2.9	0.0-0.5	.17	.24	5	2	134
	4-24	0-0	0.65-0.85	0.6-2.0	0.11-0.13	0.0-2.9	1.0-3.0	.17	.28			
	24-60	15-30	0.75-1.10	0.6-2.0	0.10-0.12	0.0-2.9	0.0-0.5	.10	.32			
218:												
Swift-----------------	0-4	2-5	0.95-1.30	0.6-2.0	0.11-0.15	0.0-2.9	0.0-0.5	.17	.24	5	2	134
	4-24	0-0	0.65-0.85	0.6-2.0	0.11-0.13	0.0-2.9	1.0-3.0	.17	.28			
	24-60	15-30	0.75-1.10	0.6-2.0	0.10-0.12	0.0-2.9	0.0-0.5	.10	.32			
219:												
Swift-----------------	0-4	2-5	0.95-1.30	0.6-2.0	0.11-0.15	0.0-2.9	0.0-0.5	.17	.24	5	2	134
	4-24	0-0	0.65-0.85	0.6-2.0	0.11-0.13	0.0-2.9	1.0-3.0	.17	.28			
	24-60	15-30	0.75-1.10	0.6-2.0	0.10-0.12	0.0-2.9	0.0-0.5	.10	.32			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
220:												
Swift-----------------	0-4	2-5	0.95-1.30	0.6-2.0	0.11-0.15	0.0-2.9	0.0-0.5	.17	.24	5	2	134
	4-24	0-0	0.65-0.85	0.6-2.0	0.11-0.13	0.0-2.9	1.0-3.0	.17	.28			
	24-60	15-30	0.75-1.10	0.6-2.0	0.10-0.12	0.0-2.9	0.0-0.5	.10	.32			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
221:												
Swift-----------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	5	2	134
	5-9	0-0	0.65-0.85	0.6-2.0	0.11-0.13	0.0-2.9	3.0-5.0	.28	.28			
	9-17	0-0	0.65-0.85	0.6-2.0	0.11-0.13	0.0-2.9	1.0-3.0	.17	.28			
	17-29	0-0	0.65-0.85	0.6-2.0	0.06-0.08	0.0-2.9	0.0-1.0	.20	.32			
	29-60	15-30	0.75-1.10	0.6-2.0	0.10-0.12	0.0-2.9	0.0-0.5	.10	.32			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
222:												
Vader-----------------	0-6	10-18	1.10-1.30	0.6-2.0	0.16-0.18	0.0-2.9	5.0-10	.15	.15	5	5	56
	6-40	10-18	1.20-1.40	0.6-2.0	0.16-0.18	0.0-2.9	2.0-5.0	.28	.28			
	40-60	5-15	1.20-1.45	2.0-6.0	0.05-0.09	0.0-2.9	0.0-1.0	.20	.20			
223:												
Vader-----------------	0-6	10-18	1.10-1.30	0.6-2.0	0.16-0.18	0.0-2.9	5.0-10	.15	.15	5	5	56
	6-40	10-18	1.20-1.40	0.6-2.0	0.16-0.18	0.0-2.9	2.0-5.0	.28	.28			
	40-60	5-15	1.20-1.45	2.0-6.0	0.05-0.09	0.0-2.9	0.0-1.0	.20	.20			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
224:												
Vanson----------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-25	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	25-56	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	56-60	---	---	---	---	---	---	---	---			
225:												
Vanson----------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-25	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	25-56	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	56-60	---	---	---	---	---	---	---	---			
226:												
Vanson----------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-25	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	25-56	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	56-60	---	---	---	---	---	---	---	---			
227:												
Vanson----------------	0-6	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	6-17	0-0	0.75-0.90	0.6-2.0	0.09-0.11	0.0-2.9	1.0-5.0	.20	.24			
	17-42	0-0	0.75-0.90	0.2-0.6	0.05-0.08	0.0-2.9	1.0-2.0	.05	.28			
	42-60	0-2	1.60-1.85	0.2-0.6	0.01-0.03	0.0-2.9	0.0-0.5	.05	.10			
228:												
Vanson----------------	0-6	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	6-17	0-0	0.75-0.90	0.6-2.0	0.09-0.11	0.0-2.9	1.0-5.0	.20	.24			
	17-42	0-0	0.75-0.90	0.2-0.6	0.05-0.08	0.0-2.9	1.0-2.0	.05	.28			
	42-60	0-2	1.60-1.85	0.2-0.6	0.01-0.03	0.0-2.9	0.0-0.5	.05	.10			
229:												
Vanson----------------	0-6	0-0	0.75-0.90	2.0-6.0	0.11-0.13	0.0-2.9	1.0-5.0	.28	.32	3	2	134
	6-20	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	20-51	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	51-55	---	---	---	---	---	---	---	---			
230:												
Vanson----------------	0-6	0-0	0.75-0.90	2.0-6.0	0.11-0.13	0.0-2.9	1.0-5.0	.28	.32	3	2	134
	6-20	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	20-51	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	51-55	---	---	---	---	---	---	---	---			
231:												
Vanson----------------	0-6	0-0	0.75-0.90	2.0-6.0	0.11-0.13	0.0-2.9	1.0-5.0	.28	.32	3	2	134
	6-20	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	20-51	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	51-55	---	---	---	---	---	---	---	---			
232:												
Vanson----------------	0-6	0-0	0.75-0.90	2.0-6.0	0.11-0.13	0.0-2.9	1.0-5.0	.28	.28	4	2	134
	6-20	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	20-51	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	51-61	---	---	---	---	---	---	---	---			
233:												
Vanson----------------	0-6	0-0	0.75-0.90	2.0-6.0	0.11-0.13	0.0-2.9	1.0-5.0	.28	.28	4	2	134
	6-20	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	20-51	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	51-61	---	---	---	---	---	---	---	---			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
234:												
Vanson----------------	0-7	0-0	0.75-0.90	2.0-6.0	0.09-0.11	0.0-2.9	1.0-5.0	.20	.28	5	3	86
	7-22	0-0	0.75-0.90	0.6-2.0	0.05-0.08	0.0-2.9	1.0-2.0	.05	.28			
	22-42	0-0	0.75-0.90	0.6-2.0	0.05-0.08	0.0-2.9	0.5-1.0	.05	.28			
	42-60	0-2	1.60-1.85	0.2-0.6	0.01-0.03	0.0-2.9	0.0-0.5	.05	.10			
235:												
Vanson----------------	0-7	0-0	0.75-0.90	2.0-6.0	0.09-0.11	0.0-2.9	1.0-5.0	.20	.28	5	3	86
	7-22	0-0	0.75-0.90	0.6-2.0	0.05-0.08	0.0-2.9	1.0-2.0	.05	.28			
	22-42	0-0	0.75-0.90	0.6-2.0	0.05-0.08	0.0-2.9	0.5-1.0	.05	.28			
	42-60	0-2	1.60-1.85	0.2-0.6	0.01-0.03	0.0-2.9	0.0-0.5	.05	.10			
236:												
Vanson----------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-25	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	25-56	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	56-60	---	---	---	---	---	---	---	---			
Hatchet---------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-23	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-0.5	.05	.28			
	23-38	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-0.5	.05	.28			
	38-42	---	---	---	---	---	---	---	---			
237:												
Vanson----------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-25	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	25-56	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	56-60	---	---	---	---	---	---	---	---			
Hatchet---------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-23	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-0.5	.05	.28			
	23-38	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-0.5	.05	.28			
	38-42	---	---	---	---	---	---	---	---			
238:												
Vanson----------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-25	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	25-56	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	56-60	---	---	---	---	---	---	---	---			
Hatchet---------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-23	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-0.5	.05	.28			
	23-38	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-0.5	.05	.28			
	38-42	---	---	---	---	---	---	---	---			
239:												
Vanson----------------	0-6	0-0	0.75-0.90	2.0-6.0	0.11-0.13	0.0-2.9	1.0-5.0	.28	.32	3	2	134
	6-20	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	20-51	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	51-55	---	---	---	---	---	---	---	---			
Hatchet---------------	0-18	0-0	0.85-1.10	0.6-2.0	0.08-0.11	0.0-2.9	1.0-5.0	.10	.24	2	5	56
	18-33	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-1.0	.05	.28			
	33-37	---	---	---	---	---	---	---	---			
240:												
Vanson----------------	0-6	0-0	0.75-0.90	2.0-6.0	0.11-0.13	0.0-2.9	1.0-5.0	.28	.32	3	2	134
	6-20	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	20-51	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	51-55	---	---	---	---	---	---	---	---			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
240:												
Hatchet---------------	0-18	0-0	0.85-1.10	0.6-2.0	0.08-0.11	0.0-2.9	1.0-5.0	.10	.24	2	5	56
	18-33	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-1.0	.05	.28			
	33-37	---	---	---	---	---	---	---	---			
241:												
Vanson----------------	0-6	0-0	0.75-0.90	2.0-6.0	0.11-0.13	0.0-2.9	1.0-5.0	.28	.32	3	2	134
	6-20	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	20-51	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	51-55	---	---	---	---	---	---	---	---			
Hatchet---------------	0-18	0-0	0.85-1.10	0.6-2.0	0.08-0.11	0.0-2.9	1.0-5.0	.10	.24	2	5	56
	18-33	0-0	0.85-1.10	0.6-2.0	0.03-0.07	0.0-2.9	0.0-1.0	.05	.28			
	33-37	---	---	---	---	---	---	---	---			
242:												
Vanson----------------	0-6	0-0	0.75-0.90	2.0-6.0	0.11-0.13	0.0-2.9	1.0-5.0	.28	.32	3	2	134
	6-20	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	20-51	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	51-55	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
243:												
Vanson----------------	0-6	0-0	0.75-0.90	2.0-6.0	0.11-0.13	0.0-2.9	1.0-5.0	.28	.32	3	2	134
	6-20	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	20-51	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	51-55	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
244:												
Vanson----------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-25	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	25-56	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	56-60	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
245:												
Vanson----------------	0-5	0-2	1.40-1.60	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5	.17	.20	3	2	134
	5-25	0-0	0.75-0.90	2.0-6.0	0.09-0.13	0.0-2.9	1.0-2.0	.28	.32			
	25-56	0-0	0.75-0.90	0.6-2.0	0.07-0.11	0.0-2.9	0.5-1.0	.10	.32			
	56-60	---	---	---	---	---	---	---	---			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
246:												
Voight----------------	0-10	15-25	1.05-1.20	0.6-2.0	0.22-0.25	0.0-2.9	5.0-10	.32	.32	5	5	56
	10-37	27-35	1.40-1.60	0.6-2.0	0.12-0.15	3.0-5.9	0.5-1.0	.20	.28			
	37-60	20-35	1.40-1.60	0.6-2.0	0.15-0.18	3.0-5.9	0.5-1.0	.24	.37			
247:												
Winston---------------	0-4	0-0	0.95-1.15	0.6-2.0	0.25-0.35	0.0-2.9	3.0-8.0	.24	.28	3	5	56
	4-24	0-0	0.95-1.15	0.6-2.0	0.20-0.35	0.0-2.9	1.0-3.0	.24	.28			
	24-60	5-10	1.00-1.20	6.0-20.0	0.15-0.25	0.0-2.9	0.5-1.0	.20	.28			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (K_{sat})	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
248:												
Wyant-----------------	0-4	20-27	1.00-1.35	0.6-2.0	0.17-0.20	0.0-2.9	5.0-10	.28	.32	3	6	48
	4-12	27-40	1.00-1.40	0.6-2.0	0.17-0.20	3.0-5.9	2.0-5.0	.28	.28			
	12-26	35-60	1.00-1.40	0.6-2.0	0.10-0.15	6.0-8.9	1.0-2.0	.20	.20			
	26-39	25-40	1.00-1.40	0.6-2.0	0.05-0.10	3.0-5.9	0.0-1.0	.24	.24			
	39-49	---	---	---	---	---	---	---	---			
249:												
Wyant-----------------	0-4	20-27	1.00-1.35	0.6-2.0	0.17-0.20	0.0-2.9	5.0-10	.28	.32	3	6	48
	4-12	27-40	1.00-1.40	0.6-2.0	0.17-0.20	3.0-5.9	2.0-5.0	.28	.28			
	12-26	35-60	1.00-1.40	0.6-2.0	0.10-0.15	6.0-8.9	1.0-2.0	.20	.20			
	26-39	25-40	1.00-1.40	0.6-2.0	0.05-0.10	3.0-5.9	0.0-1.0	.24	.24			
	39-49	---	---	---	---	---	---	---	---			
250:												
Xana------------------	0-8	0-0	0.75-0.90	6.0-20.0	0.13-0.15	0.0-2.9	3.0-5.0	.15	.20	5	2	134
	8-20	0-0	0.75-0.90	6.0-20.0	0.11-0.15	0.0-2.9	1.0-3.0	.15	.20			
	20-32	0-0	0.65-0.90	6.0-20.0	0.10-0.14	0.0-2.9	0.0-1.0	.10	.28			
	32-60	0-0	0.65-0.90	20.0-20.0	0.09-0.13	0.0-2.9	0.0-1.0	.05	.20			
251:												
Xana------------------	0-8	0-0	0.75-0.90	6.0-20.0	0.13-0.15	0.0-2.9	3.0-5.0	.15	.20	5	2	134
	8-20	0-0	0.75-0.90	6.0-20.0	0.11-0.15	0.0-2.9	1.0-3.0	.15	.20			
	20-32	0-0	0.65-0.90	6.0-20.0	0.10-0.14	0.0-2.9	0.0-1.0	.10	.28			
	32-60	0-0	0.65-0.90	20.0-20.0	0.09-0.13	0.0-2.9	0.0-1.0	.05	.20			
252:												
Xeno------------------	0-10	0-0	0.85-1.00	0.6-2.0	0.20-0.24	0.0-2.9	5.0-10	.37	.37	4	5	56
	10-24	0-0	0.90-1.10	0.6-2.0	0.19-0.21	0.0-2.9	1.0-5.0	.32	.37			
	24-54	0-0	0.90-1.10	0.6-2.0	0.18-0.20	0.0-2.9	0.0-1.0	.37	.37			
	54-64	---	---	---	---	---	---	---	---			
253:												
Xeno------------------	0-10	0-0	0.85-1.00	0.6-2.0	0.20-0.24	0.0-2.9	5.0-10	.37	.37	4	5	56
	10-24	0-0	0.90-1.10	0.6-2.0	0.19-0.21	0.0-2.9	1.0-5.0	.32	.37			
	24-54	0-0	0.90-1.10	0.6-2.0	0.18-0.20	0.0-2.9	0.0-1.0	.37	.37			
	54-64	---	---	---	---	---	---	---	---			
254:												
Xerorthents-----------	0-4	5-15	1.20-1.40	2.0-6.0	0.09-0.12	0.0-2.9	1.0-8.0	.15	.28	3	4	86
	4-35	5-35	1.25-1.45	0.6-6.0	0.08-0.11	0.0-2.9	1.0-4.0	.15	.24			
	35-60	0-5	1.45-1.65	20.0-20.0	0.03-0.05	0.0-2.9	0.0-1.0	.05	.20			
255:												
Yalelake--------------	0-12	0-0	0.65-0.85	0.6-2.0	0.11-0.15	0.0-2.9	2.0-3.0	.20	.24	5	2	134
	12-26	0-0	0.65-0.90	0.6-2.0	0.08-0.15	0.0-2.9	1.0-2.0	.15	.24			
	26-47	0-0	0.65-0.90	0.6-2.0	0.11-0.15	0.0-2.9	0.0-1.0	.20	.28			
	47-60	0-18	0.65-1.00	0.6-2.0	0.15-0.18	0.0-2.9	0.0-0.5	.15	.28			
256:												
Yalelake--------------	0-12	0-0	0.65-0.85	0.6-2.0	0.11-0.15	0.0-2.9	2.0-3.0	.20	.24	5	2	134
	12-26	0-0	0.65-0.90	0.6-2.0	0.08-0.15	0.0-2.9	1.0-2.0	.15	.24			
	26-47	0-0	0.65-0.90	0.6-2.0	0.11-0.15	0.0-2.9	0.0-1.0	.20	.28			
	47-60	0-18	0.65-1.00	0.6-2.0	0.15-0.18	0.0-2.9	0.0-0.5	.15	.28			
257:												
Yalelake--------------	0-12	0-0	0.65-0.85	0.6-2.0	0.11-0.15	0.0-2.9	2.0-3.0	.20	.24	5	2	134
	12-26	0-0	0.65-0.90	0.6-2.0	0.08-0.15	0.0-2.9	1.0-2.0	.15	.24			
	26-47	0-0	0.65-0.90	0.6-2.0	0.11-0.15	0.0-2.9	0.0-1.0	.20	.28			
	47-60	0-18	0.65-1.00	0.6-2.0	0.15-0.18	0.0-2.9	0.0-0.5	.15	.28			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (K_{sat})	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	*Pct*	*g/cc*	*In/hr*	*In/in*	*Pct*	*Pct*					
258:												
Zenker----------------	0-10	0-0	0.60-0.85	0.6-2.0	0.20-0.24	0.0-2.9	10-15	.28	.28	4	5	56
	10-18	0-0	0.60-0.85	0.6-2.0	0.18-0.22	0.0-2.9	3.0-5.0	.28	.28			
	18-41	0-0	0.75-0.90	0.6-2.0	0.14-0.17	0.0-2.9	0.0-1.0	.32	.32			
	41-45	---	---	---	---	---	---	---	---			
259:												
Zenker----------------	0-10	0-0	0.60-0.85	0.6-2.0	0.20-0.24	0.0-2.9	10-15	.28	.28	4	5	56
	10-18	0-0	0.60-0.85	0.6-2.0	0.18-0.22	0.0-2.9	3.0-5.0	.28	.28			
	18-41	0-0	0.75-0.90	0.6-2.0	0.14-0.17	0.0-2.9	0.0-1.0	.32	.32			
	41-45	---	---	---	---	---	---	---	---			
260:												
Zymer-----------------	0-10	0-0	0.65-0.85	0.6-2.0	0.11-0.15	0.0-2.9	2.0-4.0	.24	.32	5	2	134
	10-20	0-0	0.65-0.90	0.6-2.0	0.06-0.10	0.0-2.9	1.0-3.0	.15	.28			
	20-26	0-0	0.65-0.90	0.6-2.0	0.15-0.20	0.0-2.9	0.0-1.0	.15	.32			
	26-60	0-0	0.90-1.40	0.6-2.0	0.15-0.20	0.0-2.9	0.0-1.0	.10	.32			
261:												
Zymer-----------------	0-10	0-0	0.65-0.85	0.6-2.0	0.11-0.15	0.0-2.9	2.0-4.0	.24	.32	5	2	134
	10-20	0-0	0.65-0.90	0.6-2.0	0.06-0.10	0.0-2.9	1.0-3.0	.15	.28			
	20-26	0-0	0.65-0.90	0.6-2.0	0.15-0.20	0.0-2.9	0.0-1.0	.15	.32			
	26-60	0-0	0.90-1.40	0.6-2.0	0.15-0.20	0.0-2.9	0.0-1.0	.10	.32			
Rock outcrop----------	0-60	---	---	---	---	---	---	---	---	---	8	0
262:												
Zynbar----------------	0-9	0-0	0.65-0.85	0.6-2.0	0.30-0.40	0.0-2.9	5.0-10	.24	.28	5	5	56
	9-45	0-0	0.70-0.85	0.6-2.0	0.20-0.30	0.0-2.9	3.0-5.0	.20	.28			
	45-60	0-0	0.70-0.95	0.6-2.0	0.25-0.35	0.0-2.9	0.5-1.0	.24	.32			
263:												
Water-----------------	---	---	---	---	---	---	---	---	---	---	---	---

Table 18.--Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
1:								
Andaquepts-------------	0-12	33-55	---	4.5-6.5	0	0	0	0
	12-37	33-55	---	4.5-6.5	0	0	0	0
	37-60	33-55	---	4.5-6.5	0	0	0	0
2:								
Andic Cryaquepts-------	0-11	33-55	---	5.1-6.5	0	0	0	0
	11-35	33-55	---	5.1-6.5	0	0	0	0
	35-60	3.0-10	---	5.1-6.5	0	0	0	0
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
3:								
Andic Cryumbrepts------	0-17	44-66	---	5.6-6.0	0	0	0	0
	17-23	44-66	---	5.6-6.0	0	0	0	0
	23-39	44-66	---	5.6-6.0	0	0	0	0
	39-60	44-66	---	5.6-6.0	0	0	0	0
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
4:								
Andic Cryumbrepts------	0-5	0.0-2.0	5.0-15	4.5-6.0	0	0	0	0
	5-23	33-55	---	5.6-6.0	0	0	0	0
	23-35	22-44	---	5.6-6.0	0	0	0	0
	35-60	0.0-0.0	---	5.6-6.0	0	0	0	0
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
5:								
Arents-----------------	0-10	2.0-9.0	---	5.6-6.5	0	0	0	0
	10-60	5.0-15	---	5.6-6.5	0	0	0	0
6:								
Astoria----------------	0-15	33-55	35-60	4.5-5.5	0	0	0	0
	15-60	20-40	25-45	4.5-5.5	0	0	0	0
7:								
Baumgard---------------	0-11	22-44	---	5.1-6.5	0	0	0	0
	11-18	10-25	---	5.1-6.5	0	0	0	0
	18-50	10-20	---	5.1-6.5	0	0	0	0
	50-54	---	---	---	---	---	---	---
8:								
Baumgard---------------	0-11	22-44	---	5.1-6.5	0	0	0	0
	11-18	10-25	---	5.1-6.5	0	0	0	0
	18-50	10-20	---	5.1-6.5	0	0	0	0
	50-54	---	---	---	---	---	---	---
9:								
Beigle-----------------	0-13	33-55	---	5.1-6.5	0	0	0	0
	13-42	33-55	---	5.1-6.5	0	0	0	0
	42-46	22-44	---	5.1-6.5	0	0	0	0
	46-50	---	---	---	---	---	---	---
10:								
Beigle-----------------	0-13	33-55	---	5.1-6.5	0	0	0	0
	13-42	33-55	---	5.1-6.5	0	0	0	0
	42-46	22-44	---	5.1-6.5	0	0	0	0
	46-50	---	---	---	---	---	---	---

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
11:								
Boistfort--------------	0-16	33-55	---	5.1-6.0	0	0	0	0
	16-27	33-55	---	5.1-6.0	0	0	0	0
	27-60	22-44	---	5.1-6.0	0	0	0	0
12:								
Buckpeak---------------	0-21	10-20	---	5.1-6.0	0	0	0	0
	21-37	10-20	15-25	4.5-6.0	0	0	0	0
	37-60	10-20	15-25	4.5-5.5	0	0	0	0
13:								
Buckpeak---------------	0-21	10-20	---	5.1-6.0	0	0	0	0
	21-37	10-20	15-25	4.5-6.0	0	0	0	0
	37-60	10-20	15-25	4.5-5.5	0	0	0	0
14:								
Bunker-----------------	0-12	22-44	---	5.1-6.0	0	0	0	0
	12-27	22-44	---	5.1-6.0	0	0	0	0
	27-42	22-44	---	5.1-6.0	0	0	0	0
	42-46	---	---	---	---	---	---	---
15:								
Bunker-----------------	0-12	22-44	---	5.1-6.0	0	0	0	0
	12-27	22-44	---	5.1-6.0	0	0	0	0
	27-42	22-44	---	5.1-6.0	0	0	0	0
	42-46	---	---	---	---	---	---	---
16:								
Camas------------------	0-4	10-20	---	5.6-7.3	0	0	0	0
	4-22	5.0-10	---	5.6-6.0	0	0	0	0
	22-60	5.0-10	---	5.6-6.0	0	0	0	0
17:								
Caples-----------------	0-9	10-20	---	5.1-6.5	0	0	0	0
	9-39	15-25	---	5.1-6.5	0	0	0	0
	39-60	15-25	---	5.1-6.5	0	0	0	0
18:								
Carrolls---------------	0-7	0.0-5.0	---	6.1-7.3	0	0	0	0
	7-10	2.0-8.0	---	6.1-7.3	0	0	0	0
	10-60	0.0-5.0	---	6.1-7.3	0	0	0	0
19:								
Carrolls---------------	0-7	0.0-2.0	---	6.1-7.3	0	0	0	0
	7-10	1.0-5.0	---	6.1-7.3	0	0	0	0
	10-60	0.0-2.0	---	6.1-7.3	0	0	0	0
20:								
Carrolls---------------	0-10	0.0-2.0	---	6.1-7.3	0	0	0	0
	10-60	0.0-2.0	---	6.1-7.3	0	0	0	0
21:								
Centralia--------------	0-10	10-25	---	5.1-6.5	0	0	0	0
	10-41	15-20	---	5.1-6.0	0	0	0	0
	41-60	10-20	15-25	5.1-5.5	0	0	0	0
22:								
Centralia--------------	0-10	10-25	---	5.1-6.5	0	0	0	0
	10-41	15-20	---	5.1-6.0	0	0	0	0
	41-60	10-20	15-25	5.1-5.5	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
23:								
Centralia--------------	0-10	10-25	---	5.1-6.5	0	0	0	0
	10-41	15-20	---	5.1-6.0	0	0	0	0
	41-60	10-20	15-25	5.1-5.5	0	0	0	0
24:								
Cinebar----------------	0-5	1.0-5.0	5.0-15	4.5-6.0	0	0	0	0
	5-21	44-66	---	4.5-7.3	0	0	0	0
	21-60	44-66	---	5.1-6.5	0	0	0	0
25:								
Cinebar----------------	0-10	44-66	---	5.6-7.3	0	0	0	0
	10-23	44-66	---	5.6-7.3	0	0	0	0
	23-60	22-44	---	5.6-7.3	0	0	0	0
26:								
Cinebar----------------	0-10	44-66	---	5.6-7.3	0	0	0	0
	10-23	44-66	---	5.6-7.3	0	0	0	0
	23-60	22-44	---	5.6-7.3	0	0	0	0
27:								
Cinebar----------------	0-10	44-66	---	5.6-7.3	0	0	0	0
	10-23	44-66	---	5.6-7.3	0	0	0	0
	23-60	22-44	---	5.6-7.3	0	0	0	0
28:								
Cinebar----------------	0-10	44-66	---	5.6-7.3	0	0	0	0
	10-23	44-66	---	5.6-7.3	0	0	0	0
	23-60	22-44	---	5.6-7.3	0	0	0	0
29:								
Cinnamon---------------	0-3	33-55	---	5.6-7.3	0	0	0	0
	3-22	33-55	---	5.6-7.3	0	0	0	0
	22-60	33-55	---	5.6-6.5	0	0	0	0
30:								
Cinnamon---------------	0-3	33-55	---	5.6-7.3	0	0	0	0
	3-22	33-55	---	5.6-7.3	0	0	0	0
	22-60	33-55	---	5.6-6.5	0	0	0	0
31:								
Cinnamon---------------	0-3	33-55	---	5.6-7.3	0	0	0	0
	3-22	33-55	---	5.6-7.3	0	0	0	0
	22-60	33-55	---	5.6-6.5	0	0	0	0
32:								
Clato------------------	0-11	5.0-15	---	5.1-6.5	0	0	0	0
	11-80	5.0-10	---	5.1-6.5	0	0	0	0
33:								
Coweeman---------------	0-7	10-20	15-25	4.5-5.5	0	0	0	0
	7-14	15-25	---	5.1-6.0	0	0	0	0
	14-70	15-25	---	5.1-6.0	0	0	0	0
34:								
Coweeman---------------	0-7	10-20	15-25	4.5-5.5	0	0	0	0
	7-14	15-25	---	5.1-6.0	0	0	0	0
	14-70	15-25	---	5.1-6.0	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
35:								
Cowlitz----------------	0-10	2.0-5.0	---	6.1-7.3	0	0	0	0
	10-60	1.0-5.0	---	6.1-7.3	0	0	0	0
36:								
Cowlitz----------------	0-11	0.0-5.0	---	6.1-7.3	0	0	0	0
	11-60	0.0-5.0	---	6.1-7.3	0	0	0	0
37:								
Cowlitz----------------	0-11	0.0-5.0	---	6.1-7.3	0	0	0	0
	11-60	0.0-5.0	---	6.1-7.3	0	0	0	0
38:								
Cowlitz----------------	0-11	0.0-5.0	---	6.1-7.3	0	0	0	0
	11-60	0.0-5.0	---	6.1-7.3	0	0	0	0
39:								
Delameter--------------	0-10	0.0-2.0	---	5.6-6.5	0	0	0	0
	10-60	0.0-2.0	---	5.6-6.5	0	0	0	0
40:								
Dobbs------------------	0-4	33-55	---	5.6-6.5	0	0	0	0
	4-14	33-55	---	5.6-6.5	0	0	0	0
	14-35	33-55	---	5.6-6.5	0	0	0	0
	35-60	---	---	---	---	---	---	---
41:								
Dobbs------------------	0-4	33-55	---	5.6-6.5	0	0	0	0
	4-14	33-55	---	5.6-6.5	0	0	0	0
	14-35	33-55	---	5.6-6.5	0	0	0	0
	35-60	---	---	---	---	---	---	---
42:								
Domell-----------------	0-5	1.0-5.0	---	5.6-6.5	0	0	0	0
	5-13	44-66	---	5.6-6.5	0	0	0	0
	13-39	44-66	---	5.6-6.5	0	0	0	0
	39-60	22-44	---	5.6-6.5	0	0	0	0
43:								
Domell-----------------	0-8	44-66	---	5.6-6.5	0	0	0	0
	8-23	44-66	---	5.6-6.5	0	0	0	0
	23-60	22-44	---	5.6-6.5	0	0	0	0
44:								
Domell-----------------	0-8	44-66	---	5.6-6.5	0	0	0	0
	8-23	44-66	---	5.6-6.5	0	0	0	0
	23-60	22-44	---	5.6-6.5	0	0	0	0
45:								
Domell-----------------	0-12	44-66	---	5.6-6.5	0	0	0	0
	12-23	44-66	---	5.6-6.5	0	0	0	0
	23-60	22-44	---	5.6-6.5	0	0	0	0
46:								
Domell-----------------	0-12	44-66	---	5.6-6.5	0	0	0	0
	12-23	44-66	---	5.6-6.5	0	0	0	0
	23-60	22-44	---	5.6-6.5	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
47:								
Edgewick---------------	0-4	5.0-15	---	5.1-6.0	0	0	0	0
	4-25	5.0-10	---	5.1-6.5	0	0	0	0
	25-32	3.0-7.0	---	5.6-7.3	0	0	0	0
	32-60	0.0-7.0	---	5.6-7.3	0	0	0	0
48:								
Elkprairie-------------	0-6	22-44	25-50	4.5-6.0	0	0	0	0
	6-17	22-44	25-50	4.5-6.0	0	0	0	0
	17-23	22-44	25-50	4.5-6.0	0	0	0	0
	23-36	44-66	50-70	4.5-6.0	0	0	0	0
	36-60	44-66	50-70	4.5-6.0	0	0	0	0
49:								
Elochoman--------------	0-12	44-66	---	5.1-6.0	0	0	0	0
	12-26	44-66	---	5.1-6.0	0	0	0	0
	26-60	33-55	---	5.1-6.0	0	0	0	0
50:								
Ferteg-----------------	0-6	44-66	---	5.1-6.0	0	0	0	0
	6-25	44-66	---	5.1-6.0	0	0	0	0
	25-34	10-20	---	5.1-6.0	0	0	0	0
	34-60	15-25	---	5.1-6.0	0	0	0	0
51:								
Ferteg-----------------	0-6	44-66	---	5.1-6.0	0	0	0	0
	6-25	44-66	---	5.1-6.0	0	0	0	0
	25-34	10-20	---	5.1-6.0	0	0	0	0
	34-60	15-25	---	5.1-6.0	0	0	0	0
52:								
Forsyth----------------	0-7	22-44	---	5.6-7.3	0	0	0	0
	7-60	0.0-0.0	---	5.6-7.3	0	0	0	0
53:								
Forsyth----------------	0-7	22-44	---	5.6-7.3	0	0	0	0
	7-60	0.0-0.0	---	5.6-7.3	0	0	0	0
54:								
Germany----------------	0-22	22-44	25-50	4.5-6.0	0	0	0	0
	22-49	15-30	20-35	4.5-6.0	0	0	0	0
	49-72	15-25	20-30	4.5-5.5	0	0	0	0
55:								
Germany----------------	0-22	22-44	25-50	4.5-6.0	0	0	0	0
	22-49	15-30	20-35	4.5-6.0	0	0	0	0
	49-72	15-25	20-30	4.5-5.5	0	0	0	0
56:								
Germany----------------	0-22	22-44	25-50	4.5-6.0	0	0	0	0
	22-49	15-30	20-35	4.5-6.0	0	0	0	0
	49-72	15-25	20-30	4.5-5.5	0	0	0	0
57:								
Germany----------------	0-22	22-44	25-50	4.5-6.0	0	0	0	0
	22-49	15-30	20-35	4.5-6.0	0	0	0	0
	49-72	15-25	20-30	4.5-5.5	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	meq/100g	pH	Pct	Pct	mmhos/cm	
58:								
Germany----------------	0-22	22-44	25-50	4.5-6.0	0	0	0	0
	22-49	20-30	25-35	4.5-6.0	0	0	0	0
	49-59	---	---	---	---	---	---	---
59:								
Germany----------------	0-22	22-44	25-50	4.5-6.0	0	0	0	0
	22-49	20-30	25-35	4.5-6.0	0	0	0	0
	49-59	---	---	---	---	---	---	---
60:								
Germany----------------	0-22	22-44	25-50	4.5-6.0	0	0	0	0
	22-49	20-30	25-35	4.5-6.0	0	0	0	0
	49-59	---	---	---	---	---	---	---
61:								
Gobar------------------	0-10	22-44	---	5.1-6.5	0	0	0	0
	10-46	10-15	---	5.1-6.5	0	0	0	0
	46-56	---	---	---	---	---	---	---
62:								
Gobar------------------	0-10	22-44	---	5.1-6.5	0	0	0	0
	10-46	10-15	---	5.1-6.5	0	0	0	0
	46-56	---	---	---	---	---	---	---
63:								
Gobar------------------	0-10	22-44	---	5.1-6.5	0	0	0	0
	10-46	10-15	---	5.1-6.5	0	0	0	0
	46-56	---	---	---	---	---	---	---
64:								
Gobar------------------	0-10	22-44	---	5.1-6.5	0	0	0	0
	10-46	10-15	---	5.1-6.5	0	0	0	0
	46-56	---	---	---	---	---	---	---
65:								
Godfrey----------------	0-5	8.0-15	10-25	4.5-6.0	0	0	0	0
	5-27	15-25	---	5.6-6.5	0	0	0	0
	27-60	15-25	---	6.1-7.3	0	0	0	0
66:								
Greenwater-------------	0-8	2.0-10	---	5.6-7.3	0	0	0	0
	8-22	0.0-2.0	---	5.6-7.3	0	0	0	0
	22-60	0.0-2.0	---	5.6-7.3	0	0	0	0
67:								
Greenwater-------------	0-8	0.0-2.0	---	5.6-7.3	0	0	0	0
	8-22	0.0-2.0	---	5.6-7.3	0	0	0	0
	22-60	0.0-2.0	---	5.6-7.3	0	0	0	0
68:								
Greenwater-------------	0-8	2.0-10	---	5.6-7.3	0	0	0	0
	8-19	0.0-2.0	---	5.6-7.3	0	0	0	0
	19-60	0.0-2.0	---	5.6-7.3	0	0	0	0
69:								
Greenwater-------------	0-8	2.0-10	---	5.6-7.3	0	0	0	0
	8-22	0.0-2.0	---	5.6-7.3	0	0	0	0
	22-60	0.0-2.0	---	5.6-7.3	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
70:								
Hatchet----------------	0-5	1.0-5.0	5.0-15	4.5-6.0	0	0	0	0
	5-23	22-44	---	5.6-6.5	0	0	0	0
	23-38	22-44	---	5.6-6.5	0	0	0	0
	38-42	---	---	---	---	---	---	---
71:								
Hatchet----------------	0-5	1.0-5.0	5.0-15	4.5-6.0	0	0	0	0
	5-23	22-44	---	5.6-6.5	0	0	0	0
	23-38	22-44	---	5.6-6.5	0	0	0	0
	38-42	---	---	---	---	---	---	---
72:								
Hatchet----------------	0-11	22-44	---	5.1-6.5	0	0	0	0
	11-21	22-44	---	5.6-6.5	0	0	0	0
	21-36	22-44	---	5.6-6.5	0	0	0	0
	36-40	---	---	---	---	---	---	---
73:								
Hatchet----------------	0-11	22-44	---	5.1-6.5	0	0	0	0
	11-21	22-44	---	5.6-6.5	0	0	0	0
	21-36	22-44	---	5.6-6.5	0	0	0	0
	36-40	---	---	---	---	---	---	---
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
74:								
Hatchet----------------	0-11	22-44	---	5.1-6.5	0	0	0	0
	11-21	22-44	---	5.6-6.5	0	0	0	0
	21-36	22-44	---	5.6-6.5	0	0	0	0
	36-40	---	---	---	---	---	---	---
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
75:								
Hatchet----------------	0-5	1.0-5.0	5.0-15	4.5-6.0	0	0	0	0
	5-23	22-44	---	5.6-6.5	0	0	0	0
	23-38	22-44	---	5.6-6.5	0	0	0	0
	38-42	---	---	---	---	---	---	---
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
76:								
Hazeldell--------------	0-7	10-20	15-25	4.5-5.5	0	0	0	0
	7-28	10-20	15-25	4.5-5.5	0	0	0	0
	28-40	10-20	15-25	4.5-5.5	0	0	0	0
	40-60	20-30	25-35	4.5-5.5	0	0	0	0
77:								
Hazeldell--------------	0-7	10-20	15-25	4.5-5.5	0	0	0	0
	7-28	10-20	15-25	4.5-5.5	0	0	0	0
	28-40	10-20	15-25	4.5-5.5	0	0	0	0
	40-60	20-30	25-35	4.5-5.5	0	0	0	0
78:								
Hazeldell--------------	0-7	10-20	15-25	4.5-5.5	0	0	0	0
	7-28	10-20	15-25	4.5-5.5	0	0	0	0
	28-40	10-20	15-25	4.5-5.5	0	0	0	0
	40-60	20-30	25-35	4.5-5.5	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
79:								
Hazeldell--------------	0-7	10-20	15-25	4.5-5.5	0	0	0	0
	7-28	20-30	25-35	4.5-5.5	0	0	0	0
	28-40	20-30	25-35	4.5-5.5	0	0	0	0
	40-50	20-30	25-35	4.5-5.5	0	0	0	0
	50-60	---	---	---	---	---	---	---
80:								
Hazeldell--------------	0-7	10-20	15-25	4.5-5.5	0	0	0	0
	7-28	20-30	25-35	4.5-5.5	0	0	0	0
	28-40	20-30	25-35	4.5-5.5	0	0	0	0
	40-50	20-30	25-35	4.5-5.5	0	0	0	0
	50-60	---	---	---	---	---	---	---
81:								
Histic Cryaquepts------	0-13	---	40-60	5.1-5.5	0	0	0	0
	13-21	5.0-20	---	5.6-6.0	0	0	0	0
	21-31	5.0-15	---	5.6-6.0	0	0	0	0
	31-35	---	35-50	5.1-5.5	0	0	0	0
	35-60	5.0-15	---	5.6-6.0	0	0	0	0
82:								
Histic Humaquepts------	0-8	60-120	60-120	5.1-5.5	0	0	0	0
	8-20	2.0-10	---	5.6-6.0	0	0	0	0
	20-60	2.0-10	---	5.6-6.0	0	0	0	0
83:								
Hoffstadt--------------	0-5	1.0-5.0	---	5.6-6.5	0	0	0	0
	5-9	22-44	---	5.6-6.5	0	0	0	0
	9-15	22-44	---	5.6-6.5	0	0	0	0
	15-23	22-44	---	5.6-6.5	0	0	0	0
	23-52	22-44	---	5.6-6.5	0	0	0	0
	52-56	---	---	---	---	---	---	---
84:								
Hoffstadt--------------	0-5	1.0-5.0	---	5.6-6.5	0	0	0	0
	5-9	22-44	---	5.6-6.5	0	0	0	0
	9-15	22-44	---	5.6-6.5	0	0	0	0
	15-23	22-44	---	5.6-6.5	0	0	0	0
	23-52	22-44	---	5.6-6.5	0	0	0	0
	52-56	---	---	---	---	---	---	---
85:								
Hoffstadt--------------	0-4	44-66	---	5.6-6.5	0	0	0	0
	4-10	33-55	---	5.6-6.5	0	0	0	0
	10-19	22-44	---	5.6-6.5	0	0	0	0
	19-47	22-44	---	5.6-6.5	0	0	0	0
	47-51	---	---	---	---	---	---	---
86:								
Hoffstadt--------------	0-4	44-66	---	5.6-6.5	0	0	0	0
	4-10	33-55	---	5.6-6.5	0	0	0	0
	10-19	22-44	---	5.6-6.5	0	0	0	0
	19-47	22-44	---	5.6-6.5	0	0	0	0
	47-51	---	---	---	---	---	---	---

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
87:								
Hoffstadt--------------	0-4	44-66	---	5.6-6.5	0	0	0	0
	4-10	33-55	---	5.6-6.5	0	0	0	0
	10-19	22-44	---	5.6-6.5	0	0	0	0
	19-47	22-44	---	5.6-6.5	0	0	0	0
	47-51	---	---	---	---	---	---	---
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
88:								
Hoffstadt--------------	0-4	44-66	---	5.6-6.5	0	0	0	0
	4-10	33-55	---	5.6-6.5	0	0	0	0
	10-19	22-44	---	5.6-6.5	0	0	0	0
	19-47	22-44	---	5.6-6.5	0	0	0	0
	47-51	---	---	---	---	---	---	---
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
89:								
Hoffstadt--------------	0-5	1.0-5.0	---	5.6-6.5	0	0	0	0
	5-9	22-44	---	5.6-6.5	0	0	0	0
	9-15	22-44	---	5.6-6.5	0	0	0	0
	15-23	22-44	---	5.6-6.5	0	0	0	0
	23-52	22-44	---	5.6-6.5	0	0	0	0
	52-56	---	---	---	---	---	---	---
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
90:								
Hoffstadt--------------	0-5	1.0-5.0	---	5.6-6.5	0	0	0	0
	5-9	22-44	---	5.6-6.5	0	0	0	0
	9-15	22-44	---	5.6-6.5	0	0	0	0
	15-23	22-44	---	5.6-6.5	0	0	0	0
	23-52	22-44	---	5.6-6.5	0	0	0	0
	52-56	---	---	---	---	---	---	---
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
91:								
Jonas------------------	0-8	22-44	---	5.1-6.0	0	0	0	0
	8-18	22-44	---	5.1-6.0	0	0	0	0
	18-60	22-44	---	5.1-6.0	0	0	0	0
92:								
Jonas------------------	0-8	22-44	---	5.1-6.0	0	0	0	0
	8-18	22-44	---	5.1-6.0	0	0	0	0
	18-60	22-44	---	5.1-6.0	0	0	0	0
93:								
Kalama-----------------	0-7	10-15	---	5.6-6.5	0	0	0	0
	7-17	5.0-10	---	5.1-6.5	0	0	0	0
	17-21	10-20	---	5.1-6.0	0	0	0	0
	21-31	10-20	---	5.1-6.0	0	0	0	0
	31-60	10-20	---	5.1-6.0	0	0	0	0
94:								
Kalama-----------------	0-7	10-15	---	5.6-6.5	0	0	0	0
	7-17	5.0-10	---	5.1-6.5	0	0	0	0
	17-21	10-20	---	5.1-6.0	0	0	0	0
	21-31	10-20	---	5.1-6.0	0	0	0	0
	31-60	10-20	---	5.1-6.0	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
95:								
Kalama	0-7	10-15	---	5.6-6.5	0	0	0	0
	7-17	5.0-10	---	5.1-6.5	0	0	0	0
	17-21	10-20	---	5.1-6.0	0	0	0	0
	21-31	10-20	---	5.1-6.0	0	0	0	0
	31-60	10-20	---	5.1-6.0	0	0	0	0
96:								
Katula	0-5	22-44	---	5.6-6.0	0	0	0	0
	5-15	22-44	---	5.6-6.0	0	0	0	0
	15-30	22-44	---	5.6-6.0	0	0	0	0
	30-34	---	---	---	---	---	---	---
97:								
Katula	0-5	22-44	---	5.6-6.0	0	0	0	0
	5-15	22-44	---	5.6-6.0	0	0	0	0
	15-30	22-44	---	5.6-6.0	0	0	0	0
	30-34	---	---	---	---	---	---	---
98:								
Katula	0-5	22-44	---	5.6-6.0	0	0	0	0
	5-15	22-44	---	5.6-6.0	0	0	0	0
	15-30	22-44	---	5.6-6.0	0	0	0	0
	30-34	---	---	---	---	---	---	---
Bunker	0-12	22-44	---	5.1-6.0	0	0	0	0
	12-27	22-44	---	5.1-6.0	0	0	0	0
	27-42	22-44	---	5.1-6.0	0	0	0	0
	42-46	---	---	---	---	---	---	---
99:								
Katula	0-5	22-44	---	5.6-6.0	0	0	0	0
	5-15	22-44	---	5.6-6.0	0	0	0	0
	15-30	22-44	---	5.6-6.0	0	0	0	0
	30-34	---	---	---	---	---	---	---
Bunker	0-12	22-44	---	5.1-6.0	0	0	0	0
	12-27	22-44	---	5.1-6.0	0	0	0	0
	27-42	22-44	---	5.1-6.0	0	0	0	0
	42-46	---	---	---	---	---	---	---
100:								
Kelso	0-11	5.0-15	---	5.1-6.0	0	0	0	0
	11-34	10-20	---	5.1-6.0	0	0	0	0
	34-60	10-20	---	5.1-6.0	0	0	0	0
101:								
Kelso	0-11	5.0-15	---	5.1-6.0	0	0	0	0
	11-34	10-20	---	5.1-6.0	0	0	0	0
	34-60	10-20	---	5.1-6.0	0	0	0	0
102:								
Kelso	0-11	5.0-15	---	5.1-6.0	0	0	0	0
	11-34	10-20	---	5.1-6.0	0	0	0	0
	34-60	10-20	---	5.1-6.0	0	0	0	0
103:								
Kelso	0-11	5.0-15	---	5.1-6.0	0	0	0	0
	11-34	10-20	---	5.1-6.0	0	0	0	0
	34-60	10-20	---	5.1-6.0	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
104:								
Kosmos-----------------	0-7	10-20	---	5.1-6.0	0	0	0	0
	7-12	10-20	---	5.1-6.0	0	0	0	0
	12-47	10-20	---	5.1-6.0	0	0	0	0
	47-60	5.0-15	---	5.1-6.0	0	0	0	0
105:								
Lacamas----------------	0-4	10-20	15-25	5.1-5.5	0	0	0	0
	4-10	10-20	15-25	5.1-5.5	0	0	0	0
	10-20	20-30	25-35	4.5-5.0	0	0	0	0
	20-60	25-35	30-40	5.1-5.5	0	0	0	0
106:								
Lates------------------	0-12	33-55	35-60	4.5-5.5	0	0	0	0
	12-36	22-44	---	5.1-6.0	0	0	0	0
	36-40	---	---	---	---	---	---	---
107:								
Lates------------------	0-12	33-55	35-60	4.5-5.5	0	0	0	0
	12-36	22-44	---	5.1-6.0	0	0	0	0
	36-40	---	---	---	---	---	---	---
108:								
Lates------------------	0-12	33-55	35-60	4.5-5.5	0	0	0	0
	12-36	22-44	---	5.1-6.0	0	0	0	0
	36-40	---	---	---	---	---	---	---
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
109:								
Lithic Haplumbrepts----	0-8	10-25	15-30	4.5-6.0	0	0	0	0
	8-20	10-25	15-30	4.5-6.0	0	0	0	0
	20-24	---	---	---	---	---	---	---
110:								
Lithic Umbric Vitrandepts-----------	0-6	44-66	---	5.6-6.0	0	0	0	0
	6-11	44-66	---	5.6-6.0	0	0	0	0
	11-15	---	---	---	---	---	---	---
111:								
Lonestar---------------	0-2	44-66	---	5.1-6.5	0	0	0	0
	2-17	33-55	---	5.6-6.5	0	0	0	0
	17-24	33-55	---	5.6-6.5	0	0	0	0
	24-60	44-66	---	6.1-6.5	0	0	0	0
112:								
Lonestar---------------	0-5	1.0-5.0	---	5.1-6.0	0	0	0	0
	5-17	44-66	---	5.6-6.5	0	0	0	0
	17-24	33-55	---	5.6-6.5	0	0	0	0
	24-30	33-55	---	6.1-6.5	0	0	0	0
	30-60	22-44	---	6.1-6.5	0	0	0	0
113:								
Lonestar---------------	0-5	1.0-5.0	---	5.1-6.0	0	0	0	0
	5-17	44-66	---	5.6-6.5	0	0	0	0
	17-24	33-55	---	5.6-6.5	0	0	0	0
	24-30	33-55	---	6.1-6.5	0	0	0	0
	30-60	22-44	---	6.1-6.5	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
114:								
Lonestar	0-5	1.0-5.0	---	5.1-6.0	0	0	0	0
	5-17	44-66	---	5.6-6.5	0	0	0	0
	17-24	33-55	---	5.6-6.5	0	0	0	0
	24-30	33-55	---	6.1-6.5	0	0	0	0
	30-60	22-44	---	6.1-6.5	0	0	0	0
115:								
Lonestar	0-10	44-66	---	5.1-6.5	0	0	0	0
	10-17	33-55	---	5.6-6.5	0	0	0	0
	17-24	33-55	---	5.6-6.5	0	0	0	0
	24-60	44-66	---	6.1-6.5	0	0	0	0
116:								
Lonestar	0-10	44-66	---	5.1-6.5	0	0	0	0
	10-17	33-55	---	5.6-6.5	0	0	0	0
	17-24	33-55	---	5.6-6.5	0	0	0	0
	24-60	44-66	---	6.1-6.5	0	0	0	0
117:								
Lonestar	0-10	44-66	---	5.1-6.5	0	0	0	0
	10-17	33-55	---	5.6-6.5	0	0	0	0
	17-24	33-55	---	5.6-6.5	0	0	0	0
	24-60	44-66	---	6.1-6.5	0	0	0	0
118:								
Lonestar	0-10	44-66	---	5.1-6.5	0	0	0	0
	10-17	33-55	---	5.6-6.5	0	0	0	0
	17-24	33-55	---	5.6-6.5	0	0	0	0
	24-30	44-66	---	5.6-6.5	0	0	0	0
	30-50	22-44	---	6.1-6.5	0	0	0	0
	50-54	---	---	---	---	---	---	---
119:								
Loper	0-12	15-40	---	5.1-6.0	0	0	0	0
	12-28	10-25	---	5.1-6.0	0	0	0	0
	28-60	15-30	---	5.1-6.0	0	0	0	0
120:								
Loper	0-12	15-40	---	5.1-6.0	0	0	0	0
	12-28	10-25	---	5.1-6.0	0	0	0	0
	28-60	15-30	---	5.1-6.0	0	0	0	0
121:								
Lytell	0-12	44-66	50-70	4.5-5.5	0	0	0	0
	12-18	44-66	50-70	4.5-5.5	0	0	0	0
	18-55	33-55	35-60	4.5-5.5	0	0	0	0
	55-65	---	---	---	---	---	---	---
122:								
Lytell	0-12	44-66	50-70	4.5-5.5	0	0	0	0
	12-18	44-66	50-70	4.5-5.5	0	0	0	0
	18-55	33-55	35-60	4.5-5.5	0	0	0	0
	55-65	---	---	---	---	---	---	---
123:								
Mart	0-11	10-20	---	5.1-6.0	0	0	0	0
	11-20	10-20	---	5.1-6.0	0	0	0	0
	20-40	15-20	---	5.1-6.0	0	0	0	0
	40-72	15-20	---	5.1-6.0	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
124:								
Mart-------------------	0-11	10-20	---	5.1-6.0	0	0	0	0
	11-20	10-20	---	5.1-6.0	0	0	0	0
	20-40	15-20	---	5.1-6.0	0	0	0	0
	40-72	15-20	---	5.1-6.0	0	0	0	0
125:								
Mart-------------------	0-11	10-20	---	5.1-6.0	0	0	0	0
	11-20	10-20	---	5.1-6.0	0	0	0	0
	20-40	15-20	---	5.1-6.0	0	0	0	0
	40-72	15-20	---	5.1-6.0	0	0	0	0
126:								
Mart-------------------	0-11	10-20	---	5.1-6.0	0	0	0	0
	11-20	10-20	---	5.1-6.0	0	0	0	0
	20-40	15-20	---	5.1-6.0	0	0	0	0
	40-72	15-20	---	5.1-6.0	0	0	0	0
127:								
Maytown----------------	0-18	20-30	---	5.1-6.0	0	0	0	0
	18-36	10-20	---	5.1-6.0	0	0	0	0
	36-60	10-20	15-25	4.5-6.0	0	0	0	0
128:								
Melbourne--------------	0-10	15-25	---	5.6-6.5	0	0	0	0
	10-18	15-20	---	5.1-6.5	0	0	0	0
	18-35	15-30	---	5.1-6.0	0	0	0	0
	35-60	15-30	---	5.1-6.0	0	0	0	0
129:								
Melbourne--------------	0-10	15-25	---	5.6-6.5	0	0	0	0
	10-18	15-20	---	5.1-6.5	0	0	0	0
	18-35	15-30	---	5.1-6.0	0	0	0	0
	35-60	15-30	---	5.1-6.0	0	0	0	0
130:								
Minniece---------------	0-12	20-30	---	5.1-6.0	0	0	0	0
	12-42	20-40	---	5.1-6.0	0	0	0	0
	42-60	20-30	---	5.1-6.0	0	0	0	0
131:								
Mountsolo--------------	0-12	0.0-2.0	---	5.6-7.3	0	0	0	0
	12-48	---	---	---	---	---	---	---
	48-60	---	---	---	---	---	---	---
132:								
Mulholland-------------	0-12	15-30	---	5.1-6.0	0	0	0	0
	12-52	10-20	15-25	4.5-5.5	0	0	0	0
	52-60	10-20	15-25	4.5-5.5	0	0	0	0
133:								
Murnen-----------------	0-13	22-44	25-50	4.5-5.5	0	0	0	0
	13-60	22-44	25-50	4.5-5.5	0	0	0	0
134:								
Natal------------------	0-9	10-20	---	5.1-6.0	0	0	0	0
	9-64	15-25	---	5.1-7.3	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
135:								
Newaukum---------------	0-8	44-66	---	5.6-6.5	0	0	0	0
	8-41	44-66	---	5.6-7.3	0	0	0	0
	41-51	---	---	5.6-7.3	---	---	---	---
136:								
Newaukum---------------	0-8	44-66	---	5.6-6.5	0	0	0	0
	8-41	44-66	---	5.6-7.3	0	0	0	0
	41-51	---	---	5.6-7.3	---	---	---	---
137:								
Newaukum---------------	0-8	44-66	---	5.6-6.5	0	0	0	0
	8-41	44-66	---	5.6-7.3	0	0	0	0
	41-60	22-44	---	5.6-7.3	0	0	0	0
138:								
Newaukum---------------	0-8	44-66	---	5.6-6.5	0	0	0	0
	8-41	44-66	---	5.6-7.3	0	0	0	0
	41-60	22-44	---	5.6-7.3	0	0	0	0
139:								
Newaukum---------------	0-8	44-66	---	5.6-6.5	0	0	0	0
	8-41	44-66	---	5.6-7.3	0	0	0	0
	41-60	22-44	---	5.6-7.3	0	0	0	0
140:								
Newaukum---------------	0-8	44-66	---	5.6-6.5	0	0	0	0
	8-41	44-66	---	5.6-7.3	0	0	0	0
	41-60	22-44	---	5.6-7.3	0	0	0	0
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
141:								
Newberg----------------	0-10	5.0-10	---	5.6-6.5	0	0	0	0
	10-28	3.0-10	---	5.6-7.3	0	0	0	0
	28-60	2.0-10	---	5.6-7.3	0	0	0	0
142:								
Olequa-----------------	0-8	10-25	---	6.1-7.3	0	0	0	0
	8-20	5.0-15	---	4.5-6.5	0	0	0	0
	20-60	10-20	15-25	4.5-6.0	0	0	0	0
143:								
Olequa-----------------	0-8	10-25	---	6.1-7.3	0	0	0	0
	8-20	5.0-15	---	4.5-6.5	0	0	0	0
	20-60	10-20	15-25	4.5-6.0	0	0	0	0
144:								
Olequa-----------------	0-8	10-25	---	6.1-7.3	0	0	0	0
	8-20	5.0-15	---	4.5-6.5	0	0	0	0
	20-60	10-20	15-25	4.5-6.0	0	0	0	0
145:								
Olequa-----------------	0-8	10-25	---	6.1-7.3	0	0	0	0
	8-20	5.0-15	---	4.5-6.5	0	0	0	0
	20-60	10-20	15-25	4.5-6.0	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
146:								
Olympic----------------	0-4	10-25	---	5.6-6.5	0	0	0	0
	4-14	10-20	---	5.6-6.5	0	0	0	0
	14-38	15-30	20-35	4.5-6.0	0	0	0	0
	38-60	20-30	25-35	4.5-6.0	0	0	0	0
147:								
Olympic----------------	0-4	10-25	---	5.6-6.5	0	0	0	0
	4-14	10-20	---	5.6-6.5	0	0	0	0
	14-38	15-30	20-35	4.5-6.0	0	0	0	0
	38-60	20-30	25-35	4.5-6.0	0	0	0	0
148:								
Olympic----------------	0-4	10-25	---	5.6-6.5	0	0	0	0
	4-14	10-20	---	5.6-6.5	0	0	0	0
	14-38	15-30	20-35	4.5-6.0	0	0	0	0
	38-60	20-30	25-35	4.5-6.0	0	0	0	0
149:								
Olympic----------------	0-4	10-25	---	5.6-6.5	0	0	0	0
	4-14	10-20	---	5.6-6.5	0	0	0	0
	14-38	15-30	20-35	4.5-6.0	0	0	0	0
	38-60	20-30	25-35	4.5-6.0	0	0	0	0
150:								
Olympic----------------	0-8	10-25	---	5.6-6.5	0	0	0	0
	8-24	10-20	---	5.6-6.5	0	0	0	0
	24-50	20-30	25-35	4.5-6.0	0	0	0	0
	50-60	---	---	4.5-6.0	---	---	---	---
151:								
Panamaker--------------	0-3	0.0-2.0	---	6.1-7.3	0	0	0	0
	3-60	0.0-2.0	---	6.1-7.3	0	0	0	0
152:								
Panamaker--------------	0-6	0.0-2.0	---	6.1-7.3	0	0	0	0
	6-60	0.0-2.0	---	6.1-7.3	0	0	0	0
153:								
Pheeney----------------	0-7	44-66	---	5.6-6.0	0	0	0	0
	7-15	33-55	---	5.6-6.0	0	0	0	0
	15-36	22-44	---	5.1-6.0	0	0	0	0
	36-40	---	---	---	---	---	---	---
154:								
Pheeney----------------	0-7	44-66	---	5.6-6.0	0	0	0	0
	7-15	33-55	---	5.6-6.0	0	0	0	0
	15-36	22-44	---	5.1-6.0	0	0	0	0
	36-40	---	---	---	---	---	---	---
155:								
Pheeney----------------	0-7	44-66	---	5.6-6.0	0	0	0	0
	7-15	33-55	---	5.6-6.0	0	0	0	0
	15-36	22-44	---	5.1-6.0	0	0	0	0
	36-40	---	---	---	---	---	---	---
156:								
Pheeney----------------	0-7	44-66	---	5.6-6.0	0	0	0	0
	7-15	33-55	---	5.6-6.0	0	0	0	0
	15-36	22-44	---	5.1-6.0	0	0	0	0
	36-40	---	---	---	---	---	---	---

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
156:								
Beigle-----------------	0-13	33-55	---	5.1-6.5	0	0	0	0
	13-42	33-55	---	5.1-6.5	0	0	0	0
	42-46	22-44	---	5.1-6.5	0	0	0	0
	46-50	---	---	---	---	---	---	---
157:								
Pheeney----------------	0-7	44-66	---	5.6-6.0	0	0	0	0
	7-15	33-55	---	5.6-6.0	0	0	0	0
	15-36	22-44	---	5.1-6.0	0	0	0	0
	36-40	---	---	---	---	---	---	---
Beigle-----------------	0-13	33-55	---	5.1-6.5	0	0	0	0
	13-42	33-55	---	5.1-6.5	0	0	0	0
	42-46	22-44	---	5.1-6.5	0	0	0	0
	46-50	---	---	---	---	---	---	---
158:								
Pheeney----------------	0-7	44-66	---	5.6-6.0	0	0	0	0
	7-15	33-55	---	5.6-6.0	0	0	0	0
	15-36	22-44	---	5.1-6.0	0	0	0	0
	36-40	---	---	---	---	---	---	---
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
159:								
Pheeney----------------	0-7	44-66	---	5.6-6.0	0	0	0	0
	7-15	33-55	---	5.6-6.0	0	0	0	0
	15-36	22-44	---	5.1-6.0	0	0	0	0
	36-40	---	---	---	---	---	---	---
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
160:								
Pilchuck---------------	0-12	0.0-3.0	---	5.6-7.3	0	0	0	0
	12-36	0.0-2.0	---	5.6-7.3	0	0	0	0
	36-60	0.0-2.0	---	5.6-7.3	0	0	0	0
161:								
Pits-------------------	0-6	---	0.0-0.0	---	0	0	0	0
	6-60	---	0.0-0.0	---	0	0	0	0
162:								
Polepatch--------------	0-7	0.0-2.0	---	5.6-6.5	0	0	0	0
	7-12	0.0-0.0	---	5.6-6.5	0	0	0	0
	12-60	0.0-2.0	---	5.6-7.3	0	0	0	0
163:								
Polepatch--------------	0-5	0.0-0.0	---	5.6-6.5	0	0	0	0
	5-60	0.0-2.0	---	5.6-7.3	0	0	0	0
164:								
Polepatch--------------	0-5	0.0-0.0	---	5.6-6.5	0	0	0	0
	5-60	0.0-2.0	---	5.6-7.3	0	0	0	0
165:								
Polepatch--------------	0-5	0.0-0.0	---	5.6-6.5	0	0	0	0
	5-60	0.0-2.0	---	5.6-7.3	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	meq/100g	pH	Pct	Pct	mmhos/cm	
166:								
Prather----------------	0-13	10-25	---	5.6-6.5	0	0	0	0
	13-43	15-25	---	5.1-6.0	0	0	0	0
	43-60	15-30	---	5.1-6.0	0	0	0	0
167:								
Prather----------------	0-13	10-25	---	5.6-6.5	0	0	0	0
	13-43	15-25	---	5.1-6.0	0	0	0	0
	43-60	15-30	---	5.1-6.0	0	0	0	0
168:								
Raught-----------------	0-11	15-30	---	5.1-6.5	0	0	0	0
	11-60	10-20	---	4.5-6.5	0	0	0	0
169:								
Raught-----------------	0-11	15-30	---	5.1-6.5	0	0	0	0
	11-60	10-20	---	4.5-6.5	0	0	0	0
170:								
Raught-----------------	0-11	15-30	---	5.1-6.5	0	0	0	0
	11-60	10-20	---	4.5-6.5	0	0	0	0
171:								
Reichel----------------	0-19	22-44	25-50	4.5-6.0	0	0	0	0
	19-47	22-44	25-50	4.5-6.0	0	0	0	0
	47-53	22-44	25-50	4.5-6.0	0	0	0	0
	53-57	---	---	---	---	---	---	---
172:								
Riverwash--------------	0-6	0.0-3.0	---	5.1-7.3	0	0	0	0
	6-60	0.0-3.0	---	5.1-7.3	0	0	0	0
173:								
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
Rubble land------------	0-60	---	0.0-0.0	---	0	0	0	0
174:								
Rose Valley------------	0-11	10-20	15-25	4.5-6.0	0	0	0	0
	11-51	10-20	15-25	4.5-6.0	0	0	0	0
	51-75	15-25	---	5.1-6.5	0	0	0	0
175:								
Rose Valley------------	0-11	10-20	15-25	4.5-6.0	0	0	0	0
	11-51	10-20	15-25	4.5-6.0	0	0	0	0
	51-75	15-25	---	5.1-6.5	0	0	0	0
176:								
Salkum-----------------	0-12	10-20	---	5.1-6.0	0	0	0	0
	12-45	20-30	25-35	4.5-6.0	0	0	0	0
	45-60	15-25	20-30	4.5-6.0	0	0	0	0
177:								
Salkum-----------------	0-12	10-20	---	5.1-6.0	0	0	0	0
	12-45	20-30	25-35	4.5-6.0	0	0	0	0
	45-60	15-25	20-30	4.5-6.0	0	0	0	0
178:								
Salkum-----------------	0-12	10-20	---	5.1-6.0	0	0	0	0
	12-45	20-30	25-35	4.5-6.0	0	0	0	0
	45-60	15-25	20-30	4.5-6.0	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
179:								
Sara-------------------	0-11	10-15	---	5.6-6.0	0	0	0	0
	11-35	20-25	---	5.1-6.0	0	0	0	0
	35-60	20-25	---	5.1-6.0	0	0	0	0
180:								
Sara-------------------	0-11	10-15	---	5.6-6.0	0	0	0	0
	11-35	20-25	---	5.1-6.0	0	0	0	0
	35-60	20-25	---	5.1-6.0	0	0	0	0
181:								
Sara-------------------	0-11	10-15	---	5.6-6.0	0	0	0	0
	11-35	20-25	---	5.1-6.0	0	0	0	0
	35-60	20-25	---	5.1-6.0	0	0	0	0
182:								
Sara-------------------	0-11	10-15	---	5.6-6.0	0	0	0	0
	11-35	20-25	---	5.1-6.0	0	0	0	0
	35-60	20-25	---	5.1-6.0	0	0	0	0
183:								
Sarazan----------------	0-9	44-66	---	5.1-6.5	0	0	0	0
	9-31	22-44	---	5.1-6.5	0	0	0	0
	31-50	22-44	---	5.1-6.5	0	0	0	0
	50-60	---	---	---	---	---	---	---
184:								
Sarazan----------------	0-9	44-66	---	5.1-6.5	0	0	0	0
	9-31	22-44	---	5.1-6.5	0	0	0	0
	31-50	22-44	---	5.1-6.5	0	0	0	0
	50-60	---	---	---	---	---	---	---
185:								
Sauvola----------------	0-15	10-25	---	5.6-6.5	0	0	0	0
	15-27	10-25	---	4.5-6.5	0	0	0	0
	27-51	15-30	20-35	4.5-6.0	0	0	0	0
	51-60	15-30	20-35	4.5-5.5	0	0	0	0
186:								
Sauvola----------------	0-15	10-25	---	5.6-6.5	0	0	0	0
	15-27	10-25	---	4.5-6.5	0	0	0	0
	27-51	15-30	20-35	4.5-6.0	0	0	0	0
	51-60	15-30	20-35	4.5-5.5	0	0	0	0
187:								
Sauvola----------------	0-15	10-25	---	5.6-6.5	0	0	0	0
	15-27	10-25	---	4.5-6.5	0	0	0	0
	27-51	15-30	20-35	4.5-6.0	0	0	0	0
	51-60	15-30	20-35	4.5-5.5	0	0	0	0
188:								
Schneider--------------	0-12	33-55	---	5.6-6.5	0	0	0	0
	12-28	22-44	---	5.6-6.5	0	0	0	0
	28-45	22-44	---	5.6-6.5	0	0	0	0
	45-49	---	---	---	---	---	---	---
189:								
Schneider--------------	0-12	33-55	---	5.6-6.5	0	0	0	0
	12-28	22-44	---	5.6-6.5	0	0	0	0
	28-45	22-44	---	5.6-6.5	0	0	0	0
	45-49	---	---	---	---	---	---	---

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	meq/100g	pH	Pct	Pct	mmhos/cm	
190:								
Schneider	0-12	33-55	---	5.6-6.5	0	0	0	0
	12-28	22-44	---	5.6-6.5	0	0	0	0
	28-45	22-44	---	5.6-6.5	0	0	0	0
	45-49	---	---	---	---	---	---	---
Rock outcrop	0-60	---	---	---	---	---	---	---
191:								
Schneider	0-12	33-55	---	5.6-6.5	0	0	0	0
	12-28	22-44	---	5.6-6.5	0	0	0	0
	28-45	22-44	---	5.6-6.5	0	0	0	0
	45-49	---	---	---	---	---	---	---
Rock outcrop	0-60	---	---	---	---	---	---	---
192:								
Seaquest	0-6	10-20	---	5.1-6.5	0	0	0	0
	6-60	20-30	25-35	4.5-5.5	0	0	0	0
193:								
Seaquest	0-6	10-20	---	5.1-6.5	0	0	0	0
	6-60	20-30	25-35	4.5-5.5	0	0	0	0
194:								
Seaquest	0-6	10-20	---	5.1-6.5	0	0	0	0
	6-60	20-30	25-35	4.5-5.5	0	0	0	0
195:								
Semiahmoo	0-15	50-120	50-120	4.5-6.0	0	0	0	0
	15-46	50-120	50-120	4.5-6.0	0	0	0	0
	46-60	5.0-25	10-30	4.5-6.0	0	0	0	0
196:								
Siouxon	0-14	22-44	---	5.6-6.5	0	0	0	0
	14-28	22-44	---	5.6-6.5	0	0	0	0
	28-55	22-44	---	5.6-6.5	0	0	0	0
	55-59	---	---	---	---	---	---	---
197:								
Siouxon	0-14	22-44	---	5.6-6.5	0	0	0	0
	14-28	22-44	---	5.6-6.5	0	0	0	0
	28-55	22-44	---	5.6-6.5	0	0	0	0
	55-59	---	---	---	---	---	---	---
198:								
Siouxon	0-14	22-44	---	5.6-6.5	0	0	0	0
	14-28	22-44	---	5.6-6.5	0	0	0	0
	28-55	22-44	---	5.6-6.5	0	0	0	0
	55-59	---	---	---	---	---	---	---
Rock outcrop	0-60	---	---	---	---	---	---	---
199:								
Snohomish	0-7	30-40	---	5.1-6.5	0	0	0	0
	7-18	20-30	---	5.1-6.5	0	0	0	0
	18-60	50-120	---	5.1-6.0	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
200:								
Solo-------------------	0-2	0.0-5.0	---	4.5-7.3	0	0	0	0
	2-20	0.0-5.0	---	4.5-7.3	0	0	0	0
	20-32	0.0-5.0	---	5.6-6.5	0	0	0	0
	32-60	0.0-5.0	---	5.6-6.5	---	---	---	---
201:								
Speelyai---------------	0-5	0.0-2.0	---	4.5-7.3	0	0	0	0
	5-11	0.0-2.0	---	5.6-6.0	0	0	0	0
	11-60	0.0-5.0	---	5.6-6.5	---	---	---	---
202:								
Speelyai---------------	0-5	0.0-2.0	---	4.5-7.3	0	0	0	0
	5-11	0.0-2.0	---	5.6-6.0	0	0	0	0
	11-60	0.0-5.0	---	5.6-6.5	---	---	---	---
203:								
Spodic Cryopsamments---	0-12	10-20	---	5.6-6.0	0	0	0	0
	12-55	1.0-5.0	---	5.6-6.0	0	0	0	0
	55-60	1.0-3.0	---	5.6-6.0	0	0	0	0
204:								
Stahl------------------	0-7	44-66	---	5.1-6.5	0	0	0	0
	7-11	22-44	---	5.1-6.5	0	0	0	0
	11-36	22-44	---	5.1-6.5	0	0	0	0
	36-40	---	---	---	---	---	---	---
205:								
Stahl------------------	0-7	44-66	---	5.1-6.5	0	0	0	0
	7-11	22-44	---	5.1-6.5	0	0	0	0
	11-36	22-44	---	5.1-6.5	0	0	0	0
	36-40	---	---	---	---	---	---	---
Reichel----------------	0-19	22-44	25-50	4.5-6.0	0	0	0	0
	19-47	22-44	25-50	4.5-6.0	0	0	0	0
	47-53	22-44	25-50	4.5-6.0	0	0	0	0
	53-57	---	---	---	---	---	---	---
206:								
Stahl------------------	0-7	44-66	---	5.1-6.5	0	0	0	0
	7-11	22-44	---	5.1-6.5	0	0	0	0
	11-36	22-44	---	5.1-6.5	0	0	0	0
	36-40	---	---	---	---	---	---	---
Reichel----------------	0-19	22-44	25-50	4.5-6.0	0	0	0	0
	19-47	22-44	25-50	4.5-6.0	0	0	0	0
	47-53	22-44	25-50	4.5-6.0	0	0	0	0
	53-57	---	---	---	---	---	---	---
207:								
Stahl------------------	0-7	44-66	---	5.1-6.5	0	0	0	0
	7-11	22-44	---	5.1-6.5	0	0	0	0
	11-36	22-44	---	5.1-6.5	0	0	0	0
	36-40	---	---	---	---	---	---	---
Rock outcrop-----------	0-60	---	---	---	---	---	---	---

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
208:								
Stella------------------	0-11	10-20	15-25	4.5-5.5	0	0	0	0
	11-25	10-15	15-20	4.5-5.5	0	0	0	0
	25-48	10-20	15-25	5.1-5.5	0	0	0	0
	48-60	15-30	15-35	5.1-5.5	0	0	0	0
209:								
Stella------------------	0-11	10-20	15-25	4.5-5.5	0	0	0	0
	11-25	10-15	15-20	4.5-5.5	0	0	0	0
	25-48	10-20	15-25	5.1-5.5	0	0	0	0
	48-60	15-30	20-35	5.1-5.5	0	0	0	0
210:								
Stella------------------	0-11	10-20	15-25	4.5-5.5	0	0	0	0
	11-25	10-15	15-20	4.5-5.5	0	0	0	0
	25-48	10-20	15-25	5.1-5.5	0	0	0	0
	48-60	15-30	20-35	5.1-5.5	0	0	0	0
211:								
Studebaker--------------	0-8	1.0-5.0	5.0-15	4.5-6.0	0	0	0	0
	8-60	1.0-5.0	5.0-15	4.5-6.0	0	0	0	0
212:								
Swem--------------------	0-12	33-55	35-60	4.5-6.0	0	0	0	0
	12-32	22-44	25-50	4.5-6.0	0	0	0	0
	32-60	22-44	25-50	4.5-6.0	0	0	0	0
213:								
Swem--------------------	0-12	33-55	35-60	4.5-6.0	0	0	0	0
	12-32	22-44	25-50	4.5-6.0	0	0	0	0
	32-60	22-44	25-50	4.5-6.0	0	0	0	0
214:								
Swift-------------------	0-5	0.0-5.0	---	5.1-6.0	0	0	0	0
	5-9	44-66	---	5.6-6.5	0	0	0	0
	9-17	44-66	---	5.6-6.5	0	0	0	0
	17-29	44-66	---	5.6-6.5	0	0	0	0
	29-60	5.0-15	---	5.6-6.5	0	0	0	0
215:								
Swift-------------------	0-5	0.0-5.0	---	5.1-6.0	0	0	0	0
	5-9	44-66	---	5.6-6.5	0	0	0	0
	9-17	44-66	---	5.6-6.5	0	0	0	0
	17-29	44-66	---	5.6-6.5	0	0	0	0
	29-60	5.0-15	---	5.6-6.5	0	0	0	0
216:								
Swift-------------------	0-4	1.0-5.0	---	5.1-6.0	0	0	0	0
	4-24	44-66	---	5.6-6.5	0	0	0	0
	24-60	5.0-15	---	5.6-6.5	0	0	0	0
217:								
Swift-------------------	0-4	1.0-5.0	---	5.1-6.0	0	0	0	0
	4-24	44-66	---	5.6-6.5	0	0	0	0
	24-60	5.0-15	---	5.6-6.5	0	0	0	0
218:								
Swift-------------------	0-4	1.0-5.0	---	5.1-6.0	0	0	0	0
	4-24	44-66	---	5.6-6.5	0	0	0	0
	24-60	5.0-15	---	5.6-6.5	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
219:								
Swift------------------	0-4	1.0-5.0	---	5.1-6.0	0	0	0	0
	4-24	44-66	---	5.6-6.5	0	0	0	0
	24-60	5.0-15	---	5.6-6.5	0	0	0	0
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
220:								
Swift------------------	0-4	1.0-5.0	---	5.1-6.0	0	0	0	0
	4-24	44-66	---	5.6-6.5	0	0	0	0
	24-60	5.0-15	---	5.6-6.5	0	0	0	0
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
221:								
Swift------------------	0-5	0.0-5.0	---	5.1-6.0	0	0	0	0
	5-9	44-66	---	5.6-6.5	0	0	0	0
	9-17	44-66	---	5.6-6.5	0	0	0	0
	17-29	44-66	---	5.6-6.5	0	0	0	0
	29-60	5.0-15	---	5.6-6.5	0	0	0	0
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
222:								
Vader------------------	0-6	15-30	20-35	4.5-6.0	0	0	0	0
	6-40	5.0-15	10-20	4.5-6.0	0	0	0	0
	40-60	1.0-8.0	5.0-15	4.5-6.0	0	0	0	0
223:								
Vader------------------	0-6	15-30	20-35	4.5-6.0	0	0	0	0
	6-40	5.0-15	10-20	4.5-6.0	0	0	0	0
	40-60	1.0-8.0	5.0-15	4.5-6.0	0	0	0	0
224:								
Vanson-----------------	0-5	1.0-5.0	---	5.1-6.0	0	0	0	0
	5-25	33-55	---	6.1-7.3	0	0	0	0
	25-56	33-55	---	5.6-6.0	0	0	0	0
	56-60	---	---	---	---	---	---	---
225:								
Vanson-----------------	0-5	1.0-5.0	---	5.1-6.0	0	0	0	0
	5-25	33-55	---	6.1-7.3	0	0	0	0
	25-56	33-55	---	5.6-6.0	0	0	0	0
	56-60	---	---	---	---	---	---	---
226:								
Vanson-----------------	0-5	1.0-5.0	---	5.1-6.0	0	0	0	0
	5-25	33-55	---	6.1-7.3	0	0	0	0
	25-56	33-55	---	5.6-6.0	0	0	0	0
	56-60	---	---	---	---	---	---	---
227:								
Vanson-----------------	0-6	1.0-5.0	---	5.1-6.0	0	0	0	0
	6-17	33-55	---	5.1-6.5	0	0	0	0
	17-42	33-55	---	5.1-6.5	0	0	0	0
	42-60	0.0-3.0	---	5.1-6.5	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
228:								
Vanson-----------------	0-6	1.0-5.0	---	5.1-6.0	0	0	0	0
	6-17	33-55	---	5.1-6.5	0	0	0	0
	17-42	33-55	---	5.1-6.5	0	0	0	0
	42-60	0.0-3.0	---	5.1-6.5	0	0	0	0
229:								
Vanson-----------------	0-6	33-55	---	5.1-6.5	0	0	0	0
	6-20	33-55	---	6.1-7.3	0	0	0	0
	20-51	33-55	---	5.6-6.0	0	0	0	0
	51-55	---	---	---	---	---	---	---
230:								
Vanson-----------------	0-6	33-55	---	5.1-6.5	0	0	0	0
	6-20	33-55	---	6.1-7.3	0	0	0	0
	20-51	33-55	---	5.6-6.0	0	0	0	0
	51-55	---	---	---	---	---	---	---
231:								
Vanson-----------------	0-6	33-55	---	5.1-6.5	0	0	0	0
	6-20	33-55	---	6.1-7.3	0	0	0	0
	20-51	33-55	---	5.6-6.0	0	0	0	0
	51-55	---	---	---	---	---	---	---
232:								
Vanson-----------------	0-6	33-55	---	5.1-6.5	0	0	0	0
	6-20	33-55	---	6.1-7.3	0	0	0	0
	20-51	33-55	---	5.6-6.0	0	0	0	0
	51-61	---	---	---	---	---	---	---
233:								
Vanson-----------------	0-6	33-55	---	5.1-6.5	0	0	0	0
	6-20	33-55	---	6.1-7.3	0	0	0	0
	20-51	33-55	---	5.6-6.0	0	0	0	0
	51-61	---	---	---	---	---	---	---
234:								
Vanson-----------------	0-7	33-55	---	5.1-6.5	0	0	0	0
	7-22	33-55	---	5.1-6.5	0	0	0	0
	22-42	33-55	---	5.1-6.5	0	0	0	0
	42-60	0.0-3.0	---	5.1-6.5	0	0	0	0
235:								
Vanson-----------------	0-7	33-55	---	5.1-6.5	0	0	0	0
	7-22	33-55	---	5.1-6.5	0	0	0	0
	22-42	33-55	---	5.1-6.5	0	0	0	0
	42-60	0.0-3.0	---	5.1-6.5	0	0	0	0
236:								
Vanson-----------------	0-5	1.0-5.0	---	5.1-6.0	0	0	0	0
	5-25	33-55	---	6.1-7.3	0	0	0	0
	25-56	33-55	---	5.6-6.0	0	0	0	0
	56-60	---	---	---	---	---	---	---
Hatchet----------------	0-5	---	0.0-0.0	4.5-6.0	0	0	0	0
	5-23	22-44	---	5.6-6.5	0	0	0	0
	23-38	22-44	---	5.6-6.5	0	0	0	0
	38-42	---	---	---	---	---	---	---

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	meq/100g	pH	Pct	Pct	mmhos/cm	
237:								
Vanson-----------------	0-5	1.0-5.0	---	5.1-6.0	0	0	0	0
	5-25	33-55	---	6.1-7.3	0	0	0	0
	25-56	33-55	---	5.6-6.0	0	0	0	0
	56-60	---	---	---	---	---	---	---
Hatchet----------------	0-5	---	0.0-0.0	4.5-6.0	0	0	0	0
	5-23	22-44	---	5.6-6.5	0	0	0	0
	23-38	22-44	---	5.6-6.5	0	0	0	0
	38-42	---	---	---	---	---	---	---
238:								
Vanson-----------------	0-5	1.0-5.0	---	5.1-6.0	0	0	0	0
	5-25	33-55	---	6.1-7.3	0	0	0	0
	25-56	33-55	---	5.6-6.0	0	0	0	0
	56-60	---	---	---	---	---	---	---
Hatchet----------------	0-5	---	0.0-0.0	4.5-6.0	0	0	0	0
	5-23	22-44	---	5.6-6.5	0	0	0	0
	23-38	22-44	---	5.6-6.5	0	0	0	0
	38-42	---	---	---	---	---	---	---
239:								
Vanson-----------------	0-6	33-55	---	5.1-6.5	0	0	0	0
	6-20	33-55	---	6.1-7.3	0	0	0	0
	20-51	33-55	---	5.6-6.0	0	0	0	0
	51-55	---	---	---	---	---	---	---
Hatchet----------------	0-18	22-44	---	5.1-6.5	0	0	0	0
	18-33	22-44	---	5.6-6.5	0	0	0	0
	33-37	---	---	---	---	---	---	---
240:								
Vanson-----------------	0-6	33-55	---	5.1-6.5	0	0	0	0
	6-20	33-55	---	6.1-7.3	0	0	0	0
	20-51	33-55	---	5.6-6.0	0	0	0	0
	51-55	---	---	---	---	---	---	---
Hatchet----------------	0-18	22-44	---	5.1-6.5	0	0	0	0
	18-33	22-44	---	5.6-6.5	0	0	0	0
	33-37	---	---	---	---	---	---	---
241:								
Vanson-----------------	0-6	33-55	---	5.1-6.5	0	0	0	0
	6-20	33-55	---	6.1-7.3	0	0	0	0
	20-51	33-55	---	5.6-6.0	0	0	0	0
	51-55	---	---	---	---	---	---	---
Hatchet----------------	0-18	22-44	---	5.1-6.5	0	0	0	0
	18-33	22-44	---	5.6-6.5	0	0	0	0
	33-37	---	---	---	---	---	---	---
242:								
Vanson-----------------	0-6	33-55	---	5.1-6.5	0	0	0	0
	6-20	33-55	---	6.1-7.3	0	0	0	0
	20-51	33-55	---	5.6-6.0	0	0	0	0
	51-55	---	---	---	---	---	---	---
Rock outcrop-----------	0-60	---	---	---	---	---	---	---

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	meq/100g	pH	Pct	Pct	mmhos/cm	
243:								
Vanson-----------------	0-6	33-55	---	5.1-6.5	0	0	0	0
	6-20	33-55	---	6.1-7.3	0	0	0	0
	20-51	33-55	---	5.6-6.0	0	0	0	0
	51-55	---	---	---	---	---	---	---
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
244:								
Vanson-----------------	0-5	1.0-5.0	---	5.1-6.0	0	0	0	0
	5-25	33-55	---	6.1-7.3	0	0	0	0
	25-56	33-55	---	5.6-6.0	0	0	0	0
	56-60	---	---	---	---	---	---	---
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
245:								
Vanson-----------------	0-5	1.0-5.0	---	5.1-6.0	0	0	0	0
	5-25	33-55	---	6.1-7.3	0	0	0	0
	25-56	33-55	---	5.6-6.0	0	0	0	0
	56-60	---	---	---	---	---	---	---
Rock outcrop-----------	0-60	---	---	---	---	---	---	---
246:								
Voight-----------------	0-10	15-30	---	5.1-6.0	0	0	0	0
	10-37	10-20	---	5.1-6.0	0	0	0	0
	37-60	10-20	---	5.1-6.0	0	0	0	0
247:								
Winston----------------	0-4	22-44	---	5.6-6.5	0	0	0	0
	4-24	22-44	---	5.6-6.5	0	0	0	0
	24-60	2.0-5.0	---	6.6-7.3	0	0	0	0
248:								
Wyant------------------	0-4	10-20	15-25	5.1-5.5	0	0	0	0
	4-12	10-20	15-25	5.1-5.5	0	0	0	0
	12-26	15-25	20-30	4.5-5.5	0	0	0	0
	26-39	10-20	15-25	4.5-5.5	0	0	0	0
	39-49	---	---	---	---	---	---	---
249:								
Wyant------------------	0-4	10-20	15-25	5.1-5.5	0	0	0	0
	4-12	10-20	15-25	5.1-5.5	0	0	0	0
	12-26	15-25	20-30	4.5-5.5	0	0	0	0
	26-39	10-20	15-20	4.5-5.5	0	0	0	0
	39-49	---	---	---	---	---	---	---
250:								
Xana-------------------	0-8	33-55	---	5.6-6.5	0	0	0	0
	8-20	33-55	---	5.6-6.5	0	0	0	0
	20-32	33-55	---	6.1-7.3	0	0	0	0
	32-60	33-55	---	6.1-7.3	0	0	0	0
251:								
Xana-------------------	0-8	33-55	---	5.6-6.5	0	0	0	0
	8-20	33-55	---	5.6-6.5	0	0	0	0
	20-32	33-55	---	6.1-7.3	0	0	0	0
	32-60	33-55	---	6.1-7.3	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
252:								
Xeno-------------------	0-10	22-44	---	5.1-6.5	0	0	0	0
	10-24	22-44	---	5.1-6.5	0	0	0	0
	24-54	22-44	---	5.1-6.5	0	0	0	0
	54-64	---	---	---	---	---	---	---
253:								
Xeno-------------------	0-10	22-44	---	5.1-6.5	0	0	0	0
	10-24	22-44	---	5.1-6.5	0	0	0	0
	24-54	22-44	---	5.1-6.5	0	0	0	0
	54-64	---	---	---	---	---	---	---
254:								
Xerorthents------------	0-4	5.0-25	---	5.1-7.3	0	0	0	0
	4-35	5.0-25	---	5.1-7.3	0	0	0	0
	35-60	0.0-2.0	---	5.1-7.3	0	0	0	0
255:								
Yalelake---------------	0-12	44-66	---	5.1-6.5	0	0	0	0
	12-26	33-55	---	5.6-7.3	0	0	0	0
	26-47	33-55	---	5.6-7.3	0	0	0	0
	47-60	22-44	---	5.6-7.3	0	0	0	0
256:								
Yalelake---------------	0-12	44-66	---	5.1-6.5	0	0	0	0
	12-26	33-55	---	5.6-7.3	0	0	0	0
	26-47	33-55	---	5.6-7.3	0	0	0	0
	47-60	22-44	---	5.6-7.3	0	0	0	0
257:								
Yalelake---------------	0-12	44-66	---	5.1-6.5	0	0	0	0
	12-26	33-55	---	5.6-7.3	0	0	0	0
	26-47	33-55	---	5.6-7.3	0	0	0	0
	47-60	22-44	---	5.6-7.3	0	0	0	0
258:								
Zenker-----------------	0-10	44-66	50-70	4.5-6.0	0	0	0	0
	10-18	44-66	50-70	4.5-6.0	0	0	0	0
	18-41	33-55	35-60	4.5-6.0	0	0	0	0
	41-45	---	---	---	---	---	---	---
259:								
Zenker-----------------	0-10	44-66	50-70	4.5-6.0	0	0	0	0
	10-18	44-66	50-70	4.5-6.0	0	0	0	0
	18-41	33-55	35-60	4.5-6.0	0	0	0	0
	41-45	---	---	---	---	---	---	---
260:								
Zymer------------------	0-10	44-66	---	5.6-6.5	0	0	0	0
	10-20	33-55	---	5.1-6.0	0	0	0	0
	20-26	33-55	---	5.1-6.0	0	0	0	0
	26-60	0.0-0.0	---	5.1-6.0	0	0	0	0
261:								
Zymer------------------	0-10	44-66	---	5.6-6.5	0	0	0	0
	10-20	33-55	---	5.1-6.0	0	0	0	0
	20-26	33-55	---	5.1-6.0	0	0	0	0
	26-60	0.0-0.0	---	5.1-6.0	0	0	0	0
Rock outcrop-----------	0-60	---	---	---	---	---	---	---

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	*meq/100g*	*meq/100g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
262:								
Zynbar-----------------	0-9	44-66	---	5.6-7.3	0	0	0	0
	9-45	44-66	---	5.6-7.3	0	0	0	0
	45-60	33-55	---	5.6-7.3	0	0	0	0
263:								
Water------------------	---	---	---	---	---	---	---	---

Table 19.--Water Features

Map symbol and soil name	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
1:							
Andaquepts	D	None	---	---	0-0.5	Apparent	Nov-Apr
2:							
Andic Cryaquepts	D	None	---	---	0.5-1.5	Apparent	Nov-Jun
Rock outcrop	D	None	---	---	>6.0	---	---
3:							
Andic Cryumbrepts	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
4:							
Andic Cryumbrepts	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
5:							
Arents	B	None	---	---	2.0-6.0	---	Oct-May
6:							
Astoria	B	None	---	---	>6.0	---	---
7:							
Baumgard	B	None	---	---	>6.0	---	---
8:							
Baumgard	B	None	---	---	>6.0	---	---
9:							
Beigle	B	None	---	---	>6.0	---	---
10:							
Beigle	B	None	---	---	>6.0	---	---
11:							
Boistfort	B	None	---	---	>6.0	---	---
12:							
Buckpeak	B	None	---	---	>6.0	---	---
13:							
Buckpeak	B	None	---	---	>6.0	---	---
14:							
Bunker	B	None	---	---	>6.0	---	---
15:							
Bunker	B	None	---	---	>6.0	---	---
16:							
Camas	A	Occasional	Brief	Nov-May	>6.0	---	---
17:							
Caples	C	Rare	---	---	1.5-2.5	Apparent	Nov-Apr
18:							
Carrolls	D	Frequent	Brief	Oct-May	0.5-1.5	Apparent	Nov-Apr
19:							
Carrolls	D	None	---	---	0.5-1.5	Apparent	Nov-Apr

Table 19.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
20:							
Carrolls	D	Rare	---	---	+1.0-1.5	Apparent	Nov-Apr
21:							
Centralia	B	None	---	---	>6.0	---	---
22:							
Centralia	B	None	---	---	>6.0	---	---
23:							
Centralia	B	None	---	---	>6.0	---	---
24:							
Cinebar	B	None	---	---	>6.0	---	---
25:							
Cinebar	B	None	---	---	>6.0	---	---
26:							
Cinebar	B	None	---	---	>6.0	---	---
27:							
Cinebar	B	None	---	---	>6.0	---	---
28:							
Cinebar	B	None	---	---	>6.0	---	---
29:							
Cinnamon	B	None	---	---	>6.0	---	---
30:							
Cinnamon	B	None	---	---	>6.0	---	---
31:							
Cinnamon	B	None	---	---	>6.0	---	---
32:							
Clato	B	Rare	---	---	>6.0	---	---
33:							
Coweeman	D	None	---	---	1.0-2.0	Perched	Dec-Mar
34:							
Coweeman	D	None	---	---	1.0-2.0	Perched	Dec-Mar
35:							
Cowlitz	A	Occasional	Brief	Nov-Apr	>6.0	---	---
36:							
Cowlitz	A	None	---	---	>6.0	---	---
37:							
Cowlitz	A	None	---	---	>6.0	---	---
38:							
Cowlitz	A	None	---	---	>6.0	---	---
39:							
Delameter	A	None	---	---	>6.0	---	---
40:							
Dobbs	C	None	---	---	2.5-3.0	Perched	Nov-Mar

Table 19.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
41:							
Dobbs	C	None	---	---	2.5-3.0	Perched	Nov-Mar
42:							
Domell	B	None	---	---	>6.0	---	---
43:							
Domell	B	None	---	---	>6.0	---	---
44:							
Domell	B	None	---	---	>6.0	---	---
45:							
Domell	B	None	---	---	>6.0	---	---
46:							
Domell	B	None	---	---	>6.0	---	---
47:							
Edgewick	C	Occasional	Brief	Nov-Mar	>6.0	---	---
48:							
Elkprairie	B	None	---	---	>6.0	---	---
49:							
Elochoman	B	None	---	---	>6.0	---	---
50:							
Ferteg	C	None	---	---	2.5-3.5	Perched	Dec-Mar
51:							
Ferteg	C	None	---	---	2.5-3.5	Perched	Dec-Mar
52:							
Forsyth	A	None	---	---	>6.0	---	---
53:							
Forsyth	A	None	---	---	>6.0	---	---
54:							
Germany	B	None	---	---	>6.0	---	---
55:							
Germany	B	None	---	---	>6.0	---	---
56:							
Germany	B	None	---	---	>6.0	---	---
57:							
Germany	B	None	---	---	>6.0	---	---
58:							
Germany	B	None	---	---	>6.0	---	---
59:							
Germany	B	None	---	---	>6.0	---	---
60:							
Germany	B	None	---	---	>6.0	---	---
61:							
Gobar	B	None	---	---	>6.0	---	---

Table 19.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
62:							
Gobar	B	None	---	---	>6.0	---	---
63:							
Gobar	B	None	---	---	>6.0	---	---
64:							
Gobar	B	None	---	---	>6.0	---	---
65:							
Godfrey	D	Occasional	Brief	Nov-Mar	0-2.0	Apparent	Nov-Mar
66:							
Greenwater	A	Rare	---	---	>6.0	---	---
67:							
Greenwater	A	None	---	---	>6.0	---	---
68:							
Greenwater	A	Rare	---	---	>6.0	---	---
69:							
Greenwater	A	Rare	---	---	>6.0	---	---
70:							
Hatchet	B	None	---	---	>6.0	---	---
71:							
Hatchet	B	None	---	---	>6.0	---	---
72:							
Hatchet	C	None	---	---	>6.0	---	---
73:							
Hatchet	C	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
74:							
Hatchet	C	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
75:							
Hatchet	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
76:							
Hazeldell	B	None	---	---	>6.0	---	---
77:							
Hazeldell	B	None	---	---	>6.0	---	---
78:							
Hazeldell	B	None	---	---	>6.0	---	---
79:							
Hazeldell	B	None	---	---	>6.0	---	---
80:							
Hazeldell	B	None	---	---	>6.0	---	---

Table 19.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
81:							
Histic Cryaquepts-----	D	None------------	---	---	0-2.0	Apparent	Nov-Jul
82:							
Histic Humaquepts-----	D	None------------	---	---	+1.0-1.0	Apparent	Nov-Apr
83:							
Hoffstadt-------------	B	None------------	---	---	>6.0	---	---
84:							
Hoffstadt-------------	B	None------------	---	---	>6.0	---	---
85:							
Hoffstadt-------------	B	None------------	---	---	>6.0	---	---
86:							
Hoffstadt-------------	B	None------------	---	---	>6.0	---	---
87:							
Hoffstadt-------------	B	None------------	---	---	>6.0	---	---
Rock outcrop----------	D	None------------	---	---	>6.0	---	---
88:							
Hoffstadt-------------	B	None------------	---	---	>6.0	---	---
Rock outcrop----------	D	None------------	---	---	>6.0	---	---
89:							
Hoffstadt-------------	B	None------------	---	---	>6.0	---	---
Rock outcrop----------	D	None------------	---	---	>6.0	---	---
90:							
Hoffstadt-------------	B	None------------	---	---	>6.0	---	---
Rock outcrop----------	D	None------------	---	---	>6.0	---	---
91:							
Jonas-----------------	B	None------------	---	---	>6.0	---	---
92:							
Jonas-----------------	B	None------------	---	---	>6.0	---	---
93:							
Kalama----------------	C	None------------	---	---	2.5-5.0	Perched	Dec-Mar
94:							
Kalama----------------	C	None------------	---	---	2.5-5.0	Perched	Dec-Mar
95:							
Kalama----------------	C	None------------	---	---	2.5-5.0	Perched	Dec-Mar
96:							
Katula----------------	C	None------------	---	---	>6.0	---	---
97:							
Katula----------------	C	None------------	---	---	>6.0	---	---
98:							
Katula----------------	C	None------------	---	---	>6.0	---	---

Table 19.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
98:							
Bunker	B	None	---	---	>6.0	---	---
99:							
Katula	C	None	---	---	>6.0	---	---
Bunker	B	None	---	---	>6.0	---	---
100:							
Kelso	C	None	---	---	2.0-3.0	Perched	Dec-Mar
101:							
Kelso	C	None	---	---	2.0-3.0	Perched	Dec-Mar
102:							
Kelso	C	None	---	---	2.0-3.0	Perched	Dec-Mar
103:							
Kelso	C	None	---	---	2.0-3.0	Perched	Dec-Mar
104:							
Kosmos	D	None	---	---	0-2.0	Perched	Nov-May
105:							
Lacamas	D	None	---	---	0-0.5	Perched	Dec-Apr
106:							
Lates	C	None	---	---	>6.0	---	---
107:							
Lates	C	None	---	---	>6.0	---	---
108:							
Lates	C	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
109:							
Lithic Haplumbrepts	B	None	---	---	>6.0	---	---
110:							
Lithic Umbric Vitrandepts	D	None	---	---	>6.0	---	---
111:							
Lonestar	B	None	---	---	>6.0	---	---
112:							
Lonestar	B	None	---	---	>6.0	---	---
113:							
Lonestar	B	None	---	---	>6.0	---	---
114:							
Lonestar	B	None	---	---	>6.0	---	---
115:							
Lonestar	B	None	---	---	>6.0	---	---
116:							
Lonestar	B	None	---	---	>6.0	---	---

Table 19.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
117:							
Lonestar	B	None	---	---	>6.0	---	---
118:							
Lonestar	B	None	---	---	>6.0	---	---
119:							
Loper	B	None	---	---	>6.0	---	---
120:							
Loper	B	None	---	---	>6.0	---	---
121:							
Lytell	B	None	---	---	>6.0	---	---
122:							
Lytell	B	None	---	---	>6.0	---	---
123:							
Mart	B	None	---	---	>6.0	---	---
124:							
Mart	B	None	---	---	>6.0	---	---
125:							
Mart	B	None	---	---	>6.0	---	---
126:							
Mart	B	None	---	---	>6.0	---	---
127:							
Maytown	C	Occasional	Brief	Nov-Mar	2.5-3.5	Apparent	Nov-Apr
128:							
Melbourne	B	None	---	---	>6.0	---	---
129:							
Melbourne	B	None	---	---	>6.0	---	---
130:							
Minniece	D	None	---	---	0-2.0	Perched	Nov-May
131:							
Mountsolo	D	Occasional	Very brief	Nov-Apr	0-1.5	Perched	Nov-Apr
132:							
Mulholland	B	None	---	---	>6.0	---	---
133:							
Murnen	B	None	---	---	>6.0	---	---
134:							
Natal	D	None	---	---	0-1.0	Apparent	Nov-Jun
135:							
Newaukum	B	None	---	---	>6.0	---	---
136:							
Newaukum	B	None	---	---	>6.0	---	---
137:							
Newaukum	B	None	---	---	>6.0	---	---

Table 19.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
138:							
Newaukum	B	None	---	---	>6.0	---	---
139:							
Newaukum	B	None	---	---	>6.0	---	---
140:							
Newaukum	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
141:							
Newberg	B	Occasional	Brief	Dec-Mar	>6.0	---	---
142:							
Olequa	B	None	---	---	>6.0	---	---
143:							
Olequa	B	None	---	---	>6.0	---	---
144:							
Olequa	B	None	---	---	>6.0	---	---
145:							
Olequa	B	None	---	---	>6.0	---	---
146:							
Olympic	B	None	---	---	>6.0	---	---
147:							
Olympic	B	None	---	---	>6.0	---	---
148:							
Olympic	B	None	---	---	>6.0	---	---
149:							
Olympic	B	None	---	---	>6.0	---	---
150:							
Olympic	B	None	---	---	>6.0	---	---
151:							
Panamaker	A	Rare	---	---	>6.0	---	---
152:							
Panamaker	B	Occasional	Brief	Nov-Apr	>6.0	---	---
153:							
Pheeney	C	None	---	---	>6.0	---	---
154:							
Pheeney	C	None	---	---	>6.0	---	---
155:							
Pheeney	C	None	---	---	>6.0	---	---
156:							
Pheeney	C	None	---	---	>6.0	---	---
Beigle	B	None	---	---	>6.0	---	---

Table 19.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
157:							
Pheeney	C	None	---	---	>6.0	---	---
Beigle	B	None	---	---	>6.0	---	---
158:							
Pheeney	C	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
159:							
Pheeney	C	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
160:							
Pilchuck	A	Rare	---	---	>6.0	---	---
161:							
Pits	A	None	---	---	>6.0	---	---
162:							
Polepatch	A	None	---	---	>6.0	---	---
163:							
Polepatch	A	None	---	---	>6.0	---	---
164:							
Polepatch	A	None	---	---	>6.0	---	---
165:							
Polepatch	A	None	---	---	>6.0	---	---
166:							
Prather	D	None	---	---	1.5-3.0	Perched	Nov-Apr
167:							
Prather	D	None	---	---	1.5-3.0	Perched	Nov-Apr
168:							
Raught	B	None	---	---	>6.0	---	---
169:							
Raught	B	None	---	---	>6.0	---	---
170:							
Raught	B	None	---	---	>6.0	---	---
171:							
Reichel	B	None	---	---	>6.0	---	---
172:							
Riverwash	D	Frequent	Very long	Oct-Jul	0-2.0	Apparent	Jan-Dec
173:							
Rock outcrop	D	None	---	---	>6.0	---	---
Rubble land	A	None	---	---	>6.0	---	---
174:							
Rose Valley	D	None	---	---	1.0-2.0	Perched	Dec-Apr

Table 19.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
175:							
Rose Valley-----------	D	None------------	---	---	1.0-2.0	Perched	Dec-Apr
176:							
Salkum----------------	B	None------------	---	---	>6.0	---	---
177:							
Salkum----------------	B	None------------	---	---	>6.0	---	---
178:							
Salkum----------------	B	None------------	---	---	>6.0	---	---
179:							
Sara------------------	D	None------------	---	---	1.0-2.0	Perched	Dec-Apr
180:							
Sara------------------	D	None------------	---	---	1.0-2.0	Perched	Dec-Apr
181:							
Sara------------------	D	None------------	---	---	1.0-2.0	Perched	Dec-Apr
182:							
Sara------------------	D	None------------	---	---	1.0-2.0	Perched	Dec-Apr
183:							
Sarazan---------------	B	None------------	---	---	>6.0	---	---
184:							
Sarazan---------------	B	None------------	---	---	>6.0	---	---
185:							
Sauvola---------------	C	None------------	---	---	1.5-3.5	Perched	Dec-Mar
186:							
Sauvola---------------	C	None------------	---	---	1.5-3.5	Perched	Dec-Mar
187:							
Sauvola---------------	C	None------------	---	---	1.5-3.5	Perched	Dec-Mar
188:							
Schneider-------------	B	None------------	---	---	>6.0	---	---
189:							
Schneider-------------	B	None------------	---	---	>6.0	---	---
190:							
Schneider-------------	B	None------------	---	---	>6.0	---	---
Rock outcrop----------	D	None------------	---	---	>6.0	---	---
191:							
Schneider-------------	B	None------------	---	---	>6.0	---	---
Rock outcrop----------	D	None------------	---	---	>6.0	---	---
192:							
Seaquest--------------	B	None------------	---	---	>6.0	---	---
193:							
Seaquest--------------	B	None------------	---	---	>6.0	---	---

Table 19.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
194:							
Seaquest	B	None	---	---	>6.0	---	---
195:							
Semiahmoo	D	None	---	---	+1.0-0	Apparent	Nov-May
196:							
Siouxon	B	None	---	---	>6.0	---	---
197:							
Siouxon	B	None	---	---	>6.0	---	---
198:							
Siouxon	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
199:							
Snohomish	D	Rare	---	---	1.0-4.0	Apparent	Nov-May
200:							
Solo	C	None	---	---	1.5-3.0	Perched	Nov-Mar
201:							
Speelyai	D	None	---	---	0.5-1.5	Perched	Nov-Apr
202:							
Speelyai	D	None	---	---	0.5-1.5	Perched	Nov-Apr
203:							
Spodic Cryopsamments	B	None	---	---	>6.0	---	---
204:							
Stahl	C	None	---	---	>6.0	---	---
205:							
Stahl	C	None	---	---	>6.0	---	---
Reichel	B	None	---	---	>6.0	---	---
206:							
Stahl	C	None	---	---	>6.0	---	---
Reichel	B	None	---	---	>6.0	---	---
207:							
Stahl	C	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
208:							
Stella	C	None	---	---	2.0-3.0	Perched	Nov-Apr
209:							
Stella	C	None	---	---	2.0-3.0	Perched	Nov-Apr
210:							
Stella	C	None	---	---	2.0-3.0	Perched	Nov-Apr
211:							
Studebaker	B	None	---	---	>6.0	---	---

Table 19.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
212:							
Swem	C	None	---	---	2.5-3.5	Perched	Nov-Apr
213:							
Swem	C	None	---	---	2.5-3.5	Perched	Nov-Apr
214:							
Swift	B	None	---	---	>6.0	---	---
215:							
Swift	B	None	---	---	>6.0	---	---
216:							
Swift	B	None	---	---	>6.0	---	---
217:							
Swift	B	None	---	---	>6.0	---	---
218:							
Swift	B	None	---	---	>6.0	---	---
219:							
Swift	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
220:							
Swift	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
221:							
Swift	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
222:							
Vader	B	None	---	---	>6.0	---	---
223:							
Vader	B	None	---	---	>6.0	---	---
224:							
Vanson	B	None	---	---	>6.0	---	---
225:							
Vanson	B	None	---	---	>6.0	---	---
226:							
Vanson	B	None	---	---	>6.0	---	---
227:							
Vanson	B	None	---	---	>6.0	---	---
228:							
Vanson	B	None	---	---	>6.0	---	---
229:							
Vanson	B	None	---	---	>6.0	---	---
230:							
Vanson	B	None	---	---	>6.0	---	---

Table 19.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
231:							
Vanson	B	None	---	---	>6.0	---	---
232:							
Vanson	B	None	---	---	>6.0	---	---
233:							
Vanson	B	None	---	---	>6.0	---	---
234:							
Vanson	B	None	---	---	>6.0	---	---
235:							
Vanson	B	None	---	---	>6.0	---	---
236:							
Vanson	B	None	---	---	>6.0	---	---
Hatchet	B	None	---	---	>6.0	---	---
237:							
Vanson	B	None	---	---	>6.0	---	---
Hatchet	B	None	---	---	>6.0	---	---
238:							
Vanson	B	None	---	---	>6.0	---	---
Hatchet	B	None	---	---	>6.0	---	---
239:							
Vanson	B	None	---	---	>6.0	---	---
Hatchet	C	None	---	---	>6.0	---	---
240:							
Vanson	B	None	---	---	>6.0	---	---
Hatchet	C	None	---	---	>6.0	---	---
241:							
Vanson	B	None	---	---	>6.0	---	---
Hatchet	C	None	---	---	>6.0	---	---
242:							
Vanson	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
243:							
Vanson	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
244:							
Vanson	B	None	---	---	>6.0	---	---
Rock outcrop	D	None	---	---	>6.0	---	---
245:							
Vanson	B	None	---	---	>6.0	---	---

Table 19.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
245:							
Rock outcrop----------	D	None------------	---	---	>6.0	---	---
246:							
Voight----------------	B	None------------	---	---	>6.0	---	---
247:							
Winston---------------	B	None------------	---	---	>6.0	---	---
248:							
Wyant-----------------	C	None------------	---	---	>6.0	---	---
249:							
Wyant-----------------	C	None------------	---	---	>6.0	---	---
250:							
Xana------------------	B	None------------	---	---	>6.0	---	---
251:							
Xana------------------	B	None------------	---	---	>6.0	---	---
252:							
Xeno------------------	B	None------------	---	---	>6.0	---	---
253:							
Xeno------------------	B	None------------	---	---	>6.0	---	---
254:							
Xerorthents-----------	B	None------------	---	---	>6.0	---	---
255:							
Yalelake--------------	B	None------------	---	---	>6.0	---	---
256:							
Yalelake--------------	B	None------------	---	---	>6.0	---	---
257:							
Yalelake--------------	B	None------------	---	---	>6.0	---	---
258:							
Zenker----------------	B	None------------	---	---	>6.0	---	---
259:							
Zenker----------------	B	None------------	---	---	>6.0	---	---
260:							
Zymer-----------------	B	None------------	---	---	>6.0	---	---
261:							
Zymer-----------------	B	None------------	---	---	>6.0	---	---
Rock outcrop----------	D	None------------	---	---	>6.0	---	---
262:							
Zynbar----------------	B	None------------	---	---	>6.0	---	---
263:							
Water-----------------	---	---	---	---	---	---	---

Table 20.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
1:									
Andaquepts	---	---	---	---	0	---	High	High	High.
2:									
Andic Cryaquepts	Bedrock (lithic)	20-80	---	Indurated	0	---	Moderate	Moderate	Moderate.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
3:									
Andic Cryumbrepts	Bedrock (lithic)	40-80	---	Indurated	0	---	Moderate	Moderate	Moderate.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
4:									
Andic Cryumbrepts	Bedrock (lithic)	40-80	---	Indurated	0	---	Moderate	High	High.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
5:									
Arents	---	---	---	---	0	---	Moderate	Moderate	Moderate.
6:									
Astoria	---	---	---	---	0	---	---	High	High.
7:									
Baumgard	Bedrock (lithic)	40-60	---	Indurated	0	---	Moderate	Moderate	Moderate.
8:									
Baumgard	Bedrock (lithic)	40-60	---	Indurated	0	---	Moderate	Moderate	Moderate.
9:									
Beigle	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
10:									
Beigle	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
11:									
Boistfort	---	---	---	---	0	---	High	High	High.
12:									
Buckpeak	---	---	---	---	0	---	Moderate	High	High.
13:									
Buckpeak	---	---	---	---	0	---	Moderate	High	High.
14:									
Bunker	Bedrock (lithic)	40-60	---	Indurated	0	---	High	High	High.
15:									
Bunker	Bedrock (lithic)	40-60	---	Indurated	0	---	High	High	High.
16:									
Camas	---	---	---	---	0	---	Low	Moderate	Moderate.
17:									
Caples	---	---	---	---	0	---	Low	Moderate	Moderate.

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Subsidence: Initial	Subsidence: Total	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In		In	In			
18:									
Carrolls	---	---	---	---	0	---	Low	Moderate	Low.
19:									
Carrolls	---	---	---	---	0	---	Low	Moderate	Low.
20:									
Carrolls	---	---	---	---	0	---	Low	Moderate	Low.
21:									
Centralia	---	---	---	---	0	---	Moderate	High	High.
22:									
Centralia	---	---	---	---	0	---	Moderate	High	High.
23:									
Centralia	---	---	---	---	0	---	Moderate	High	High.
24:									
Cinebar	---	---	---	---	0	---	High	High	High.
25:									
Cinebar	---	---	---	---	0	---	High	High	High.
26:									
Cinebar	---	---	---	---	0	---	High	High	High.
27:									
Cinebar	---	---	---	---	0	---	High	High	High.
28:									
Cinebar	---	---	---	---	0	---	High	High	High.
29:									
Cinnamon	---	---	---	---	0	---	High	Moderate	Moderate.
30:									
Cinnamon	---	---	---	---	0	---	High	Moderate	Moderate.
31:									
Cinnamon	---	---	---	---	0	---	High	Moderate	Moderate.
32:									
Clato	---	---	---	---	0	---	High	Moderate	Moderate.
33:									
Coweeman	---	---	---	---	0	---	Moderate	High	High.
34:									
Coweeman	---	---	---	---	0	---	Moderate	High	High.
35:									
Cowlitz	---	---	---	---	0	---	Low	Moderate	Low.
36:									
Cowlitz	---	---	---	---	0	---	Low	Moderate	Low.
37:									
Cowlitz	---	---	---	---	0	---	Low	Moderate	Low.
38:									
Cowlitz	---	---	---	---	0	---	Low	Moderate	Low.

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
39:									
Delameter	---	---	---	---	0	---	Low	Moderate	Low.
40:									
Dobbs	Dense material	30-40	---	Noncemented	0	---	Moderate	Moderate	Moderate.
41:									
Dobbs	Dense material	30-40	---	Noncemented	0	---	Moderate	Moderate	Moderate.
42:									
Domell	---	---	---	---	0	---	High	Moderate	Moderate.
43:									
Domell	---	---	---	---	0	---	High	Moderate	Moderate.
44:									
Domell	---	---	---	---	0	---	High	Moderate	Moderate.
45:									
Domell	---	---	---	---	0	---	High	Moderate	Moderate.
46:									
Domell	---	---	---	---	0	---	High	Moderate	Moderate.
47:									
Edgewick	---	---	---	---	0	---	Moderate	High	High.
48:									
Elkprairie	---	---	---	---	0	---	High	High	High.
49:									
Elochoman	---	---	---	---	0	---	High	High	High.
50:									
Ferteg	---	---	---	---	0	---	High	Moderate	Moderate.
51:									
Ferteg	---	---	---	---	0	---	High	Moderate	Moderate.
52:									
Forsyth	---	---	---	---	0	---	Low	Moderate	Moderate.
53:									
Forsyth	---	---	---	---	0	---	Low	Moderate	Moderate.
54:									
Germany	---	---	---	---	0	---	Moderate	High	High.
55:									
Germany	---	---	---	---	0	---	Moderate	High	High.
56:									
Germany	---	---	---	---	0	---	Moderate	High	High.
57:									
Germany	---	---	---	---	0	---	Moderate	High	High.
58:									
Germany	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	Moderate	High	High.

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
59:									
Germany	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	Moderate	High	High.
60:									
Germany	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	Moderate	High	High.
61:									
Gobar	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
62:									
Gobar	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
63:									
Gobar	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
64:									
Gobar	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
65:									
Godfrey	---	---	---	---	0	---	Moderate	High	High.
66:									
Greenwater	---	---	---	---	0	---	Low	Moderate	Moderate.
67:									
Greenwater	---	---	---	---	0	---	Low	Moderate	Moderate.
68:									
Greenwater	---	---	---	---	0	---	Low	Moderate	Moderate.
69:									
Greenwater	---	---	---	---	0	---	Low	Moderate	Moderate.
70:									
Hatchet	Bedrock (lithic)	20-40	---	Indurated	0	---	High	High	High.
71:									
Hatchet	Bedrock (lithic)	20-40	---	Indurated	0	---	High	High	High.
72:									
Hatchet	Bedrock (lithic)	20-40	---	Indurated	0	---	High	Moderate	Moderate.
73:									
Hatchet	Bedrock (lithic)	20-40	---	Indurated	0	---	High	Moderate	Moderate.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
74:									
Hatchet	Bedrock (lithic)	20-40	---	Indurated	0	---	High	Moderate	Moderate.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
75:									
Hatchet	Bedrock (lithic)	20-40	---	Indurated	0	---	High	High	High.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
76:									
Hazeldell	---	---	---	---	0	---	Low	Moderate	Moderate.
77:									
Hazeldell	---	---	---	---	0	---	Low	Moderate	Moderate.
78:									
Hazeldell	---	---	---	---	0	---	Low	Moderate	Moderate.
79:									
Hazeldell	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	Low	Moderate	Moderate.
80:									
Hazeldell	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	Low	Moderate	Moderate.
81:									
Histic Cryaquepts	---	---	---	---	0	---	High	High	High.
82:									
Histic Humaquepts	Bedrock (paralithic).	20-80	---	Moderately cemented.	0	---	High	Moderate	Moderate.
83:									
Hoffstadt	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
84:									
Hoffstadt	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
85:									
Hoffstadt	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
86:									
Hoffstadt	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
87:									
Hoffstadt	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
88:									
Hoffstadt	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
89:									
Hoffstadt	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
90:									
Hoffstadt	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
91:									
Jonas	---	---	---	---	0	---	High	Moderate	Moderate.
92:									
Jonas	---	---	---	---	0	---	High	Moderate	Moderate.

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
93:									
Kalama	---	---	---	---	0	---	Moderate	Moderate	Moderate.
94:									
Kalama	---	---	---	---	0	---	Moderate	Moderate	Moderate.
95:									
Kalama	---	---	---	---	0	---	Moderate	Moderate	Moderate.
96:									
Katula	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	High	High.
97:									
Katula	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	High	High.
98:									
Katula	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	High	High.
Bunker	Bedrock (lithic)	40-60	---	Indurated	0	---	High	High	High.
99:									
Katula	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	High	High.
Bunker	Bedrock (lithic)	40-60	---	Indurated	0	---	High	High	High.
100:									
Kelso	---	---	---	---	0	---	Moderate	Moderate	Moderate.
101:									
Kelso	---	---	---	---	0	---	Moderate	Moderate	Moderate.
102:									
Kelso	---	---	---	---	0	---	Moderate	Moderate	Moderate.
103:									
Kelso	---	---	---	---	0	---	Moderate	Moderate	Moderate.
104:									
Kosmos	---	---	---	---	0	---	Moderate	Moderate	Moderate.
105:									
Lacamas	---	---	---	---	0	---	Moderate	High	High.
106:									
Lates	Bedrock (lithic)	20-40	---	Indurated	0	---	High	High	High.
107:									
Lates	Bedrock (lithic)	20-40	---	Indurated	0	---	High	High	High.
108:									
Lates	Bedrock (lithic)	20-40	---	Indurated	0	---	High	High	High.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
109:									
Lithic Haplumbrepts	Bedrock (lithic)	10-20	---	Indurated	0	---	Low	High	High.
110:									
Lithic Umbric Vitrandepts	Bedrock (lithic)	10-20	---	Indurated	0	---	Low	Moderate	Moderate.

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
111:									
Lonestar	---	---	---	---	0	---	High	Moderate	Moderate.
112:									
Lonestar	---	---	---	---	0	---	High	High	High.
113:									
Lonestar	---	---	---	---	0	---	High	High	High.
114:									
Lonestar	---	---	---	---	0	---	High	High	High.
115:									
Lonestar	---	---	---	---	0	---	High	Moderate	Moderate.
116:									
Lonestar	---	---	---	---	0	---	High	Moderate	Moderate.
117:									
Lonestar	---	---	---	---	0	---	High	Moderate	Moderate.
118:									
Lonestar	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
119:									
Loper	---	---	---	---	0	---	Low	High	High.
120:									
Loper	---	---	---	---	0	---	Low	High	High.
121:									
Lytell	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	High	High.
122:									
Lytell	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	High	High.
123:									
Mart	---	---	---	---	0	---	High	High	High.
124:									
Mart	---	---	---	---	0	---	High	High	High.
125:									
Mart	---	---	---	---	0	---	High	High	High.
126:									
Mart	---	---	---	---	0	---	High	High	High.
127:									
Maytown	---	---	---	---	0	---	Low	High	High.
128:									
Melbourne	---	---	---	---	0	---	Moderate	High	High.
129:									
Melbourne	---	---	---	---	0	---	Moderate	High	High.
130:									
Minniece	---	---	---	---	0	---	---	Moderate	Moderate.

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Subsidence: Initial	Subsidence: Total	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	*In*		*In*	*In*			
131:									
Mountsolo	Dense material	10-20	0-3	Noncemented	0	---	Low	Moderate	Low.
132:									
Mulholland	---	---	---	---	0	---	High	Moderate	Moderate.
133:									
Murnen	---	---	---	---	0	---	High	High	High.
134:									
Natal	---	---	---	---	0	---	Low	High	High.
135:									
Newaukum	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
136:									
Newaukum	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
137:									
Newaukum	---	---	---	---	0	---	High	Moderate	Moderate.
138:									
Newaukum	---	---	---	---	0	---	High	Moderate	Moderate.
139:									
Newaukum	---	---	---	---	0	---	High	Moderate	Moderate.
140:									
Newaukum	---	---	---	---	0	---	High	Moderate	Moderate.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
141:									
Newberg	---	---	---	---	0	---	Low	Moderate	Moderate.
142:									
Olequa	---	---	---	---	0	---	High	High	High.
143:									
Olequa	---	---	---	---	0	---	High	High	High.
144:									
Olequa	---	---	---	---	0	---	High	High	High.
145:									
Olequa	---	---	---	---	0	---	High	High	High.
146:									
Olympic	---	---	---	---	0	---	Moderate	High	High.
147:									
Olympic	---	---	---	---	0	---	Moderate	High	High.
148:									
Olympic	---	---	---	---	0	---	Moderate	High	High.
149:									
Olympic	---	---	---	---	0	---	Moderate	High	High.

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
150:									
Olympic	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	Moderate	High	High.
151:									
Panamaker	---	---	---	---	0	---	Low	Moderate	Low.
152:									
Panamaker	---	---	---	---	0	---	Low	Moderate	Low.
153:									
Pheeney	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	Moderate	Moderate.
154:									
Pheeney	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	Moderate	Moderate.
155:									
Pheeney	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	Moderate	Moderate.
156:									
Pheeney	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	Moderate	Moderate.
Beigle	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
157:									
Pheeney	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	Moderate	Moderate.
Beigle	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
158:									
Pheeney	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	Moderate	Moderate.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
159:									
Pheeney	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	Moderate	Moderate.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
160:									
Pilchuck	---	---	---	---	0	---	Low	Moderate	Moderate.
161:									
Pits	---	---	---	---	0	---	None	---	---
162:									
Polepatch	---	---	---	---	0	---	Low	High	High.
163:									
Polepatch	---	---	---	---	0	---	Low	Moderate	Moderate.
164:									
Polepatch	---	---	---	---	0	---	Low	Moderate	Moderate.
165:									
Polepatch	---	---	---	---	0	---	Low	Moderate	Moderate.
166:									
Prather	---	---	---	---	0	---	Moderate	Moderate	Moderate.
167:									
Prather	---	---	---	---	0	---	Moderate	Moderate	Moderate.

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Subsidence: Initial	Subsidence: Total	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	*In*		*In*	*In*			
168:									
Raught	---	---	---	---	0	---	Moderate	High	High.
169:									
Raught	---	---	---	---	0	---	Moderate	High	High.
170:									
Raught	---	---	---	---	0	---	Moderate	High	High.
171:									
Reichel	Bedrock (lithic)	40-60	---	Indurated	0	---	High	High	High.
172:									
Riverwash	---	---	---	---	0	---	None	---	---
173:									
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
Rubble land	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
174:									
Rose Valley	---	---	---	---	0	---	High	Moderate	Moderate.
175:									
Rose Valley	---	---	---	---	0	---	High	Moderate	Moderate.
176:									
Salkum	---	---	---	---	0	---	Moderate	High	High.
177:									
Salkum	---	---	---	---	0	---	Moderate	High	High.
178:									
Salkum	---	---	---	---	0	---	Moderate	High	High.
179:									
Sara	---	---	---	---	0	---	Moderate	Moderate	Moderate.
180:									
Sara	---	---	---	---	0	---	Moderate	Moderate	Moderate.
181:									
Sara	---	---	---	---	0	---	Moderate	Moderate	Moderate.
182:									
Sara	---	---	---	---	0	---	Moderate	Moderate	Moderate.
183:									
Sarazan	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
184:									
Sarazan	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
185:									
Sauvola	---	---	---	---	0	---	Moderate	High	High.
186:									
Sauvola	---	---	---	---	0	---	Moderate	High	High.

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
187:									
Sauvola	---	---	---	---	0	---	Moderate	High	High.
188:									
Schneider	Bedrock (lithic)	40-60	---	Indurated	0	---	Moderate	Moderate	Moderate.
189:									
Schneider	Bedrock (lithic)	40-60	---	Indurated	0	---	Moderate	Moderate	Moderate.
190:									
Schneider	Bedrock (lithic)	40-60	---	Indurated	0	---	Moderate	Moderate	Moderate.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
191:									
Schneider	Bedrock (lithic)	40-60	---	Indurated	0	---	Moderate	Moderate	Moderate.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
192:									
Seaquest	---	---	---	---	0	---	Moderate	High	High.
193:									
Seaquest	---	---	---	---	0	---	Moderate	High	High.
194:									
Seaquest	---	---	---	---	0	---	Moderate	High	High.
195:									
Semiahmoo	---	---	---	---	6-12	60-80	Low	High	High.
196:									
Siouxon	Bedrock (lithic)	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
197:									
Siouxon	Bedrock (lithic)	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
198:									
Siouxon	Bedrock (lithic)	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
199:									
Snohomish	---	---	---	---	3-6	20-42	High	Moderate	Moderate.
200:									
Solo	Duripan	20-40	---	Weakly cemented	0	---	Low	High	High.
201:									
Speelyai	Duripan	10-20	---	Weakly cemented	0	---	Low	High	High.
202:									
Speelyai	Duripan	10-20	---	Weakly cemented	0	---	Low	High	High.
203:									
Spodic Cryopsamments	Bedrock (lithic)	40-70	---	Indurated	0	---	High	Moderate	Moderate.
204:									
Stahl	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	Moderate	Moderate.

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Subsidence: Initial	Subsidence: Total	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In		In	In			
205:									
Stahl	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	Moderate	Moderate.
Reichel	Bedrock (lithic)	40-60	---	Indurated	0	---	High	High	High.
206:									
Stahl	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	Moderate	Moderate.
Reichel	Bedrock (lithic)	40-60	---	Indurated	0	---	High	High	High.
207:									
Stahl	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	Moderate	Moderate.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
208:									
Stella	---	---	---	---	0	---	High	High	High.
209:									
Stella	---	---	---	---	0	---	High	High	High.
210:									
Stella	---	---	---	---	0	---	High	High	High.
211:									
Studebaker	---	---	---	---	0	---	Low	High	High.
212:									
Swem	---	---	---	---	0	---	Moderate	High	High.
213:									
Swem	---	---	---	---	0	---	Moderate	High	High.
214:									
Swift	---	---	---	---	0	---	Moderate	High	High.
215:									
Swift	---	---	---	---	0	---	Moderate	High	High.
216:									
Swift	---	---	---	---	0	---	Moderate	High	High.
217:									
Swift	---	---	---	---	0	---	Moderate	High	High.
218:									
Swift	---	---	---	---	0	---	Moderate	High	High.
219:									
Swift	---	---	---	---	0	---	Moderate	High	High.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
220:									
Swift	---	---	---	---	0	---	Moderate	High	High.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
221:									
Swift	---	---	---	---	0	---	Moderate	High	High.
Rock outcrop	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
222:									
Vader	---	---	---	---	0	---	Moderate	High	High.
223:									
Vader	---	---	---	---	0	---	Moderate	High	High.
224:									
Vanson	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
225:									
Vanson	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
226:									
Vanson	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
227:									
Vanson	Dense material	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
228:									
Vanson	Dense material	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
229:									
Vanson	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
230:									
Vanson	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
231:									
Vanson	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
232:									
Vanson	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
233:									
Vanson	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
234:									
Vanson	---	---	---	---	0	---	High	Moderate	Moderate.
235:									
Vanson	---	---	---	---	0	---	High	Moderate	Moderate.
236:									
Vanson	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
Hatchet	Bedrock (lithic)	20-40	---	Indurated	0	---	High	High	High.
237:									
Vanson	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
Hatchet	Bedrock (lithic)	20-40	---	Indurated	0	---	High	High	High.
238:									
Vanson	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
Hatchet	Bedrock (lithic)	20-40	---	Indurated	0	---	High	High	High.

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
239:									
Vanson------------------	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
Hatchet-----------------	Bedrock (lithic)	20-40	---	Indurated	0	---	High	Moderate	Moderate.
240:									
Vanson------------------	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
Hatchet-----------------	Bedrock (lithic)	20-40	---	Indurated	0	---	High	Moderate	Moderate.
241:									
Vanson------------------	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
Hatchet-----------------	Bedrock (lithic)	20-40	---	Indurated	0	---	High	Moderate	Moderate.
242:									
Vanson------------------	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
Rock outcrop------------	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
243:									
Vanson------------------	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
Rock outcrop------------	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
244:									
Vanson------------------	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
Rock outcrop------------	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
245:									
Vanson------------------	Bedrock (lithic)	40-60	---	Indurated	0	---	High	Moderate	Moderate.
Rock outcrop------------	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
246:									
Voight------------------	---	---	---	---	0	---	Moderate	Moderate	Moderate.
247:									
Winston-----------------	---	---	---	---	0	---	Moderate	Moderate	Moderate.
248:									
Wyant-------------------	Bedrock (paralithic).	20-40	---	Moderately cemented.	0	---	Moderate	Moderate	Moderate.
249:									
Wyant-------------------	Bedrock (paralithic).	20-40	---	Moderately cemented.	0	---	Moderate	Moderate	Moderate.
250:									
Xana--------------------	---	---	---	---	0	---	High	Moderate	Moderate.
251:									
Xana--------------------	---	---	---	---	0	---	High	Moderate	Moderate.
252:									
Xeno--------------------	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.
253:									
Xeno--------------------	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	Moderate	Moderate.

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Subsidence: Initial	Subsidence: Total	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	*In*		*In*	*In*			
254:									
Xerorthents------------	Bedrock (paralithic).	20-70	---	Moderately cemented.	0	---	High	Moderate	Moderate.
255:									
Yalelake---------------	---	---	---	---	0	---	High	Moderate	Low.
256:									
Yalelake---------------	---	---	---	---	0	---	High	Moderate	Low.
257:									
Yalelake---------------	---	---	---	---	0	---	High	Moderate	Low.
258:									
Zenker-----------------	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	High	High.
259:									
Zenker-----------------	Bedrock (paralithic).	40-60	---	Moderately cemented.	0	---	High	High	High.
260:									
Zymer------------------	---	---	---	---	0	---	Moderate	Moderate	Moderate.
261:									
Zymer------------------	---	---	---	---	0	---	Moderate	Moderate	Moderate.
Rock outcrop-----------	Bedrock (lithic)	0-0	---	Indurated	0	---	None	---	---
262:									
Zynbar-----------------	---	---	---	---	0	---	High	Moderate	Moderate.
263:									
Water------------------	---	---	---	---	---	---	---	---	---

Table 21.--Classification of the Soils

Soil name	Family or higher taxonomic class
Andaquepts	Mesic Andaquepts
Andic Cryaquepts	Andic Cryaquepts
Andic Cryumbrepts	Andic Cryumbrepts
Arents	Arents
Astoria	Medial, mesic Andic Haplumbrepts
Baumgard	Fine-loamy, mixed, mesic Andeptic Haplohumults
Beigle	Medial, frigid Andic Haplumbrepts
Boistfort	Medial over clayey, oxidic, mesic Typic Dystrandepts
Buckpeak	Fine-loamy, mixed, mesic Xeric Palehumults
Bunker	Medial over clayey, oxidic, mesic Typic Dystrandepts
Camas	Sandy-skeletal, mixed, mesic Fluventic Haploxerolls
Caples	Fine, mixed, nonacid, mesic Mollic Fluvaquents
Carrolls	Mixed, mesic Typic Psammaquents
Centralia	Fine-loamy, mixed, mesic Xeric Palehumults
Cinebar	Medial, mesic Typic Dystrandepts
Cinnamon	Ashy over medial, frigid Typic Vitrandepts
Clato	Coarse-silty, mixed, mesic Fluventic Xerochrepts
Coweeman	Fine, mixed, mesic Aquic Palexeralfs
Cowlitz	Sandy-skeletal, mixed, mesic Typic Xerorthents
Delameter	Sandy-skeletal, mixed, frigid Typic Udorthents
Dobbs	Medial-skeletal, frigid Andic Haplumbrepts
Domell	Medial, frigid Typic Dystrandepts
Edgewick	Coarse-loamy, mixed, mesic Fluventic Haplumbrepts
Elkprairie	Ashy over medial Typic Cryorthents
Elochoman	Medial, mesic Typic Dystrandepts
Ferteg	Medial over loamy, mixed, mesic Aquic Dystrandepts
Forsyth	Sandy-skeletal, mixed, frigid Andeptic Udorthents
Germany	Clayey, oxidic, mesic Typic Palehumults
Gobar	Medial, mesic Andic Haplumbrepts
Godfrey	Fine, mixed, nonacid, mesic Typic Fluvaquents
Greenwater	Mixed, mesic Dystric Xeropsamments
Hatchet	Medial-skeletal Typic Cryorthods
Hazeldell	Clayey, mixed, mesic Xeric Palehumults
Histic Cryaquepts	Histic Cryaquepts
Histic Humaquepts	Histic Humaquepts
Hoffstadt	Medial-skeletal, frigid Andic Dystrochrepts
Jonas	Medial, frigid Andic Haplumbrepts
Kalama	Fine-loamy, mixed, mesic Aquic Palexeralfs
Katula	Medial-skeletal, mesic Andic Haplumbrepts
Kelso	Fine-silty, mixed, mesic Ultic Palexeralfs
Kosmos	Fine-loamy, mixed, mesic Typic Ochraqualfs
Lacamas	Fine, mixed, mesic Typic Glossaqualfs
Lates	Medial, frigid Andic Haplumbrepts
Lithic Haplumbrepts	Lithic Haplumbrepts
Lithic Umbric Vitrandepts	Lithic Umbric Vitrandepts
Lonestar	Ashy over medial Humic Cryorthods
Loper	Fine, mixed, mesic Mollic Hapludalfs
Lytell	Medial, mesic Typic Dystrandepts
Mart	Fine, mixed, mesic Pachic Ultic Argixerolls
Maytown	Fine-silty, mixed, mesic Fluventic Haploxerolls
Melbourne	Fine, mixed, mesic Ultic Palexeralfs
Minniece	Fine, mixed, mesic Typic Umbraqualfs
Mountsolo	Sandy, mixed, mesic Aquic Xerorthents
Mulholland	Fine, montmorillonitic, mesic Typic Argiudolls
Murnen	Medial, frigid Andic Haplumbrepts
Natal	Fine, mixed, mesic Umbric Ochraqualfs
Newaukum	Medial, mesic Typic Dystrandepts
Newberg	Coarse-loamy, mixed, mesic Fluventic Haploxerolls
Olequa	Fine-silty, mixed, mesic Xeric Palehumults
Olympic	Clayey, mixed, mesic Xeric Palehumults
Panamaker	Mixed, mesic Typic Xeropsamments
Pheeney	Medial-skeletal, frigid Andic Xerumbrepts
Pilchuck	Mixed, mesic Dystric Xeropsamments

Table 21.--Classification of the Soils--Continued

Soil name	Family or higher taxonomic class
Polepatch	Sandy-skeletal, mixed Typic Cryorthents
Prather	Fine, mixed, mesic Aquic Palexeralfs
Raught	Clayey, oxidic, mesic Typic Palehumults
Reichel	Medial Andic Cryumbrepts
Rose Valley	Fine-silty, mixed, mesic Aquic Palexeralfs
Salkum	Clayey, kaolinitic, mesic Xeric Palehumults
Sara	Fine, mixed, mesic Aquic Palexeralfs
Sarazan	Medial-skeletal, frigid Andic Dystrochrepts
Sauvola	Fine, mixed, mesic Ultic Palexeralfs
Schneider	Loamy-skeletal, mixed, mesic Andic Xerumbrepts
Seaquest	Clayey, mixed, mesic Xeric Palehumults
Semiahmoo	Euic, mesic Typic Medisaprists
Siouxon	Medial-skeletal, mesic Andic Xerumbrepts
Snohomish	Fine-silty, mixed, nonacid, mesic Thapto-Histic Fluvaquents
Solo	Mixed, mesic Typic Xeropsamments
Speelyai	Mixed, mesic, shallow Typic Xeropsamments
Spodic Cryopsamments	Spodic Cryopsamments
Stahl	Medial-skeletal Andic Cryumbrepts
Stella	Fine-silty, mixed, mesic Aquic Palexeralfs
Studebaker	Sandy-skeletal, mixed Typic Cryorthents
Swem	Medial, mesic Andaquic Haplumbrepts
Swift	Ashy over loamy-skeletal, mixed, frigid Typic Vitrandepts
Vader	Coarse-loamy, mixed, mesic Dystric Xerochrepts
Vanson	Ashy over loamy-skeletal, mixed Typic Cryorthods
Voight	Fine-loamy, mixed Eutric Glossoboralfs
Winston	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic Typic Haplorthods
Wyant	Fine, montmorillonitic, mesic Ultic Argixerolls
Xana	Ashy over cindery Typic Cryorthods
Xeno	Medial, frigid Andic Haplumbrepts
Xerorthents	Xerorthents
Yalelake	Ashy over medial, mesic Umbric Vitrandepts
Zenker	Medial, mesic Typic Dystrandepts
Zymer	Ashy over loamy-skeletal, mixed, mesic Umbric Vitrandepts
Zynbar	Medial, frigid Entic Dystrandepts

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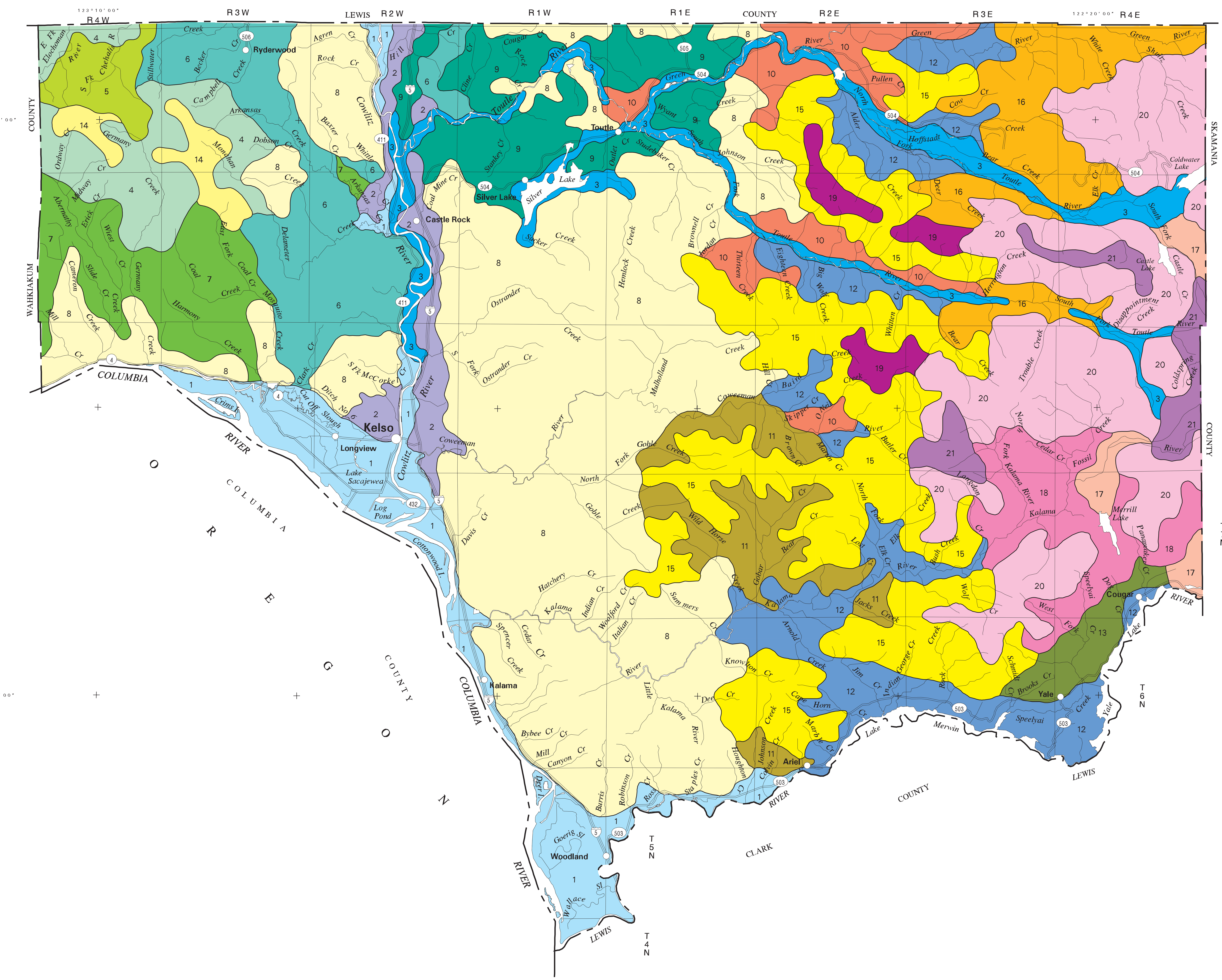


LEGEND

SOILS DOMINANTLY ON FLOOD PLAINS AND TERRACES

- 1 Caples-Clato-Newberg
- 2 Kelso-Kalama-Minniece
- 3 Riverwash-Cowlitz-Delameter

SOILS DOMINANTLY ON WARM TERRACES AND UPLANDS

- 4 Loper-Bunker
- 5 Zenker-Lytell
- 6 Centralia-Buckpeak
- 7 Germany-Raught
- 8 Hazeldell-Olympic
- 9 Seaquest-Sara
- 10 Baumgard-Schneider
- 11 Gobar-Mulholland
- 12 Cinebar-Newaukum-Siouxon
- 13 Yalelake-Zymer

SOILS DOMINANTLY ON COOL TERRACES AND UPLANDS

- 14 Lates-Murnen
- 15 Pheeney-Beigle
- 16 Hoffstadt-Domell
- 17 Studebaker-Forsyth-Lithic Umbric Vitrandepts
- 18 Swift-Cinnamon

SOILS DOMINANTLY ON COLD TERRACES AND UPLANDS

- 19 Stahl-Reichel
- 20 Vanson-Hatchet-Lonestar
- 21 Polepatch-Andic Cryumbrepts

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

N

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES
WASHINGTON STATE UNIVERSITY AGRICULTURE RESEARCH CENTER

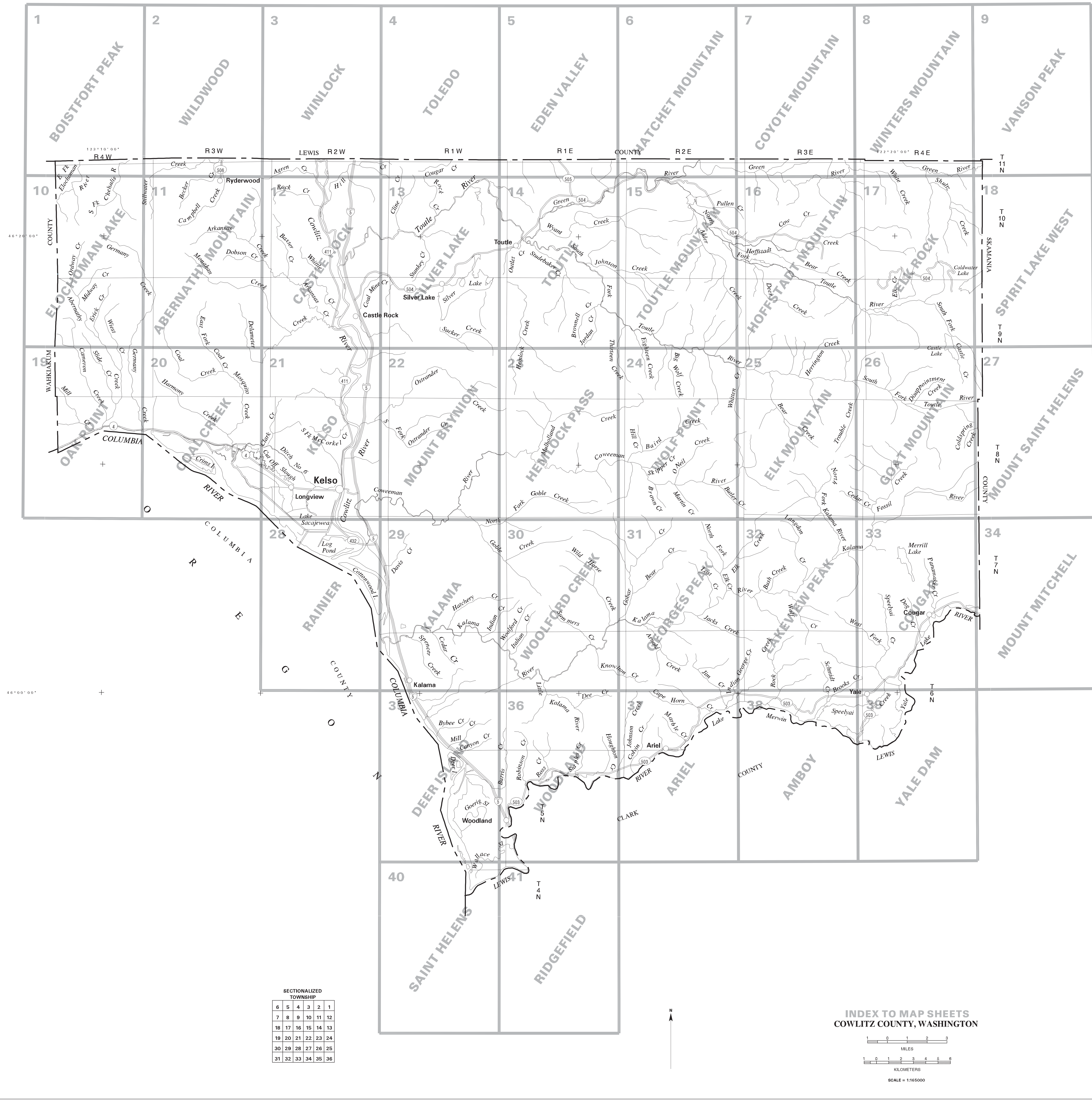
GENERAL SOIL MAP
COWLITZ COUNTY, WASHINGTON

1 0 1 2 3
MILES

1 0 1 2 3 4 5 6
KILOMETERS

SCALE = 1:165000

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS
COWLITZ COUNTY, WASHINGTON
SCALE = 1:165000
MILES
KILOMETERS
SECTIONALIZED TOWNSHIP
1 BOISTFORT PEAK
2 WILDWOOD
3 WINLOCK
4 TOLEDO
5 EDEN VALLEY
6 HATCHET MOUNTAIN
7 COYOTE MOUNTAIN
8 WINTERS MOUNTAIN
9 VANSON PEAK
10 ELOCHOMAN LAKE
11 ABERNATHY MOUNTAIN
12 CASTLE ROCK
13 SILVER LAKE
14 TOUTLE
15 TOUTLE MOUNTAIN
16 HOFFSTADT MOUNTAIN
17 ELK ROCK
18 SPIRIT LAKE WEST
19 OAK POINT
20 COAL CREEK
21 KELSO
22 MOUNT BRYNION
23 HEMLOCK PASS
24 WOLF POINT
25 ELK MOUNTAIN
26 GOAT MOUNTAIN
27 MOUNT SAINT HELENS
28 RAINIER
29 KALAMA
30 WOOLFORD CREEK
31 GEORGES PEAK
32 LAKEVIEW PEAK
33 COUGAR
34 MOUNT MITCHELL
35 DEER ISLAND
36 WOODLAND
37 ARIEL
38 AMBOY
39 YALE DAM
40 SAINT HELENS
41 RIDGEFIELD
LEWIS COUNTY
WAHKIAKUM COUNTY
SKAMANIA COUNTY
CLARK COUNTY
COLUMBIA COUNTY
OREGON
COLUMBIA RIVER
R4W R3W R2W R1W R1E R2E R3E R4E
T11N T10N T9N T8N T7N T6N T5N T4N
Ryderwood
Castle Rock
Silver Lake
Toutle
Kelso
Longview
Kalama
Woodland
Ariel
Yale
Cougar

SYMBOL	NAME
199	Snohomish silty clay loam, 0 to 1 percent slopes
200	Solo gravelly loamy sand, 0 to 8 percent slopes
201	Speelyai gravelly loamy sand, 0 to 8 percent slopes
202	Speelyai gravelly loamy sand, 15 to 60 percent slopes
203	Spodic Cryopsamments, 0 to 30 percent slopes
204	Stahl very gravelly silt loam, 30 to 65 percent slopes
205	Stahl-Reichel complex, 5 to 30 percent slopes
206	Stahl-Reichel complex, 30 to 65 percent slopes
207	Stahl-Rock outcrop complex, 30 to 75 percent slopes
208	Stella silt loam, 3 to 8 percent slopes
209	Stella silt loam, 8 to 15 percent slopes
210	Stella silt loam, 15 to 30 percent slopes
211	Studebaker very gravelly loamy sand, 0 to 20 percent slopes
212	Swem cobbly silt loam, 5 to 30 percent slopes
213	Swem cobbly silt loam, 30 to 65 percent slopes
214	Swift loamy sand, overblown, 30 to 65 percent slopes
215	Swift loamy sand, overblown, 65 to 90 percent slopes
216	Swift sandy loam, 5 to 30 percent slopes
217	Swift sandy loam, 30 to 65 percent slopes
218	Swift sandy loam, 65 to 90 percent slopes
219	Swift-Rock outcrop complex, 30 to 65 percent slopes
220	Swift-Rock outcrop complex, 65 to 90 percent slopes
221	Swift, overblown-Rock outcrop complex, 40 to 90 percent slopes
222	Vader loam, 5 to 30 percent slopes
223	Vader loam, 30 to 65 percent slopes
224	Vanson loamy sand, overblown, 5 to 30 percent slopes
225	Vanson loamy sand, overblown, 30 to 65 percent slopes
226	Vanson loamy sand, overblown, 65 to 90 percent slopes
227	Vanson loamy sand, till substratum, overblown, 5 to 30 percent slopes
228	Vanson loamy sand, till substratum, overblown, 30 to 65 percent slopes
229	Vanson sandy loam, 5 to 30 percent slopes
230	Vanson sandy loam, 30 to 65 percent slopes
231	Vanson sandy loam, 65 to 90 percent slopes
232	Vanson sandy loam, tuff substratum, 5 to 30 percent slopes
233	Vanson sandy loam, tuff substratum, 30 to 65 percent slopes
234	Vanson cobbly sandy loam, till substratum, 5 to 30 percent slopes
235	Vanson cobbly sandy loam, till substratum, 30 to 65 percent slopes
236	Vanson-Hatchet loamy sands, overblown, 5 to 30 percent slopes
237	Vanson-Hatchet loamy sands, overblown, 30 to 65 percent slopes
238	Vanson-Hatchet loamy sands, overblown, 65 to 90 percent slopes
239	Vanson-Hatchet complex, 5 to 30 percent slopes
240	Vanson-Hatchet complex, 30 to 65 percent slopes
241	Vanson-Hatchet complex, 65 to 90 percent slopes
242	Vanson-Rock outcrop complex, 30 to 65 percent slopes
243	Vanson-Rock outcrop complex, 65 to 90 percent slopes
244	Vanson, overblown-Rock outcrop complex, 30 to 65 percent slopes
245	Vanson, overblown-Rock outcrop complex, 65 to 90 percent slopes
246	Voight silt loam, 5 to 30 percent slopes
247	Winston silt loam, 0 to 8 percent slopes
248	Wyant loam, 5 to 30 percent slopes
249	Wyant loam, 30 to 65 percent slopes
250	Xana loamy sand, 5 to 30 percent slopes
251	Xana loamy sand, 30 to 65 percent slopes
252	Xeno silt loam, 5 to 30 percent slopes
253	Xeno silt loam, 30 to 65 percent slopes
254	Xerorthents, 50 to 90 percent slopes
255	Yalelake sandy loam, 5 to 30 percent slopes
256	Yalelake sandy loam, 30 to 65 percent slopes
257	Yalelake sandy loam, 65 to 90 percent slopes
258	Zenker silt loam, 30 to 65 percent slopes
259	Zenker silt loam, 65 to 90 percent slopes
260	Zymer sandy loam, 30 to 65 percent slopes
261	Zymer-Rock outcrop complex, 65 to 90 percent slopes
262	Zynbar silt loam, 5 to 30 percent slopes
263	Water

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES
- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park)
- Land grant
- Limit of soil survey (label) and/or denied access area
- Field sheet matchline & neatline
- Previously Published Survey

OTHER BOUNDARY (label)
- Airport, airfield
- Cemetery
- City/county park

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(section and land grants)

GEOGRAPHIC COORDINATE TICK

TRANSPORTATION
- Divided roads
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS
- Interstate — 173, 79 345
- Federal — 287, 410 224
- State — 52, 52 347
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE
(normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES
- Without road
- With road
- With railroad
- Single side slope (showing actual feature location)

DAMS
- Medium or Small

LANDFORM FEATURES
- Prominent hill or peak
- Soil Sample Site

MISCELLANEOUS CULTURAL FEATURES
- Farmstead, house (omit in urban areas)
- Church
- School
- Other Religion (label) — Mt Carmel
- Located object (label) — Ranger Station
- Tank (label) — Petroleum
- Lookout Tower
- Oil and/or Natural Gas Wells
- Windmill
- Lighthouse

HYDROGRAPHIC FEATURES

STREAMS
- Perennial, double line
- Perennial, single line — Label only
- Intermittent — Label only
- Drainage end — Label only

DRAINAGE AND IRRIGATION
- Double-line canal (label) — CANAL
- Perennial drainage and/or irrigation ditch — Label only
- Intermittent drainage and/ or irrigation ditch — Label only

SMALL LAKES, PONDS AND RESERVOIRS
- Perennial water
- Miscellaneous water
- Flood pool line — FLOOD POOL LINE

MISCELLANEOUS WATER FEATURES
- Spring
- Well, artesian
- Well, irrigation

SPECIAL SYMBOLS FOR SOIL SURVEY AND SSURGO

SOIL DELINEATIONS AND SYMBOLS — 7 51

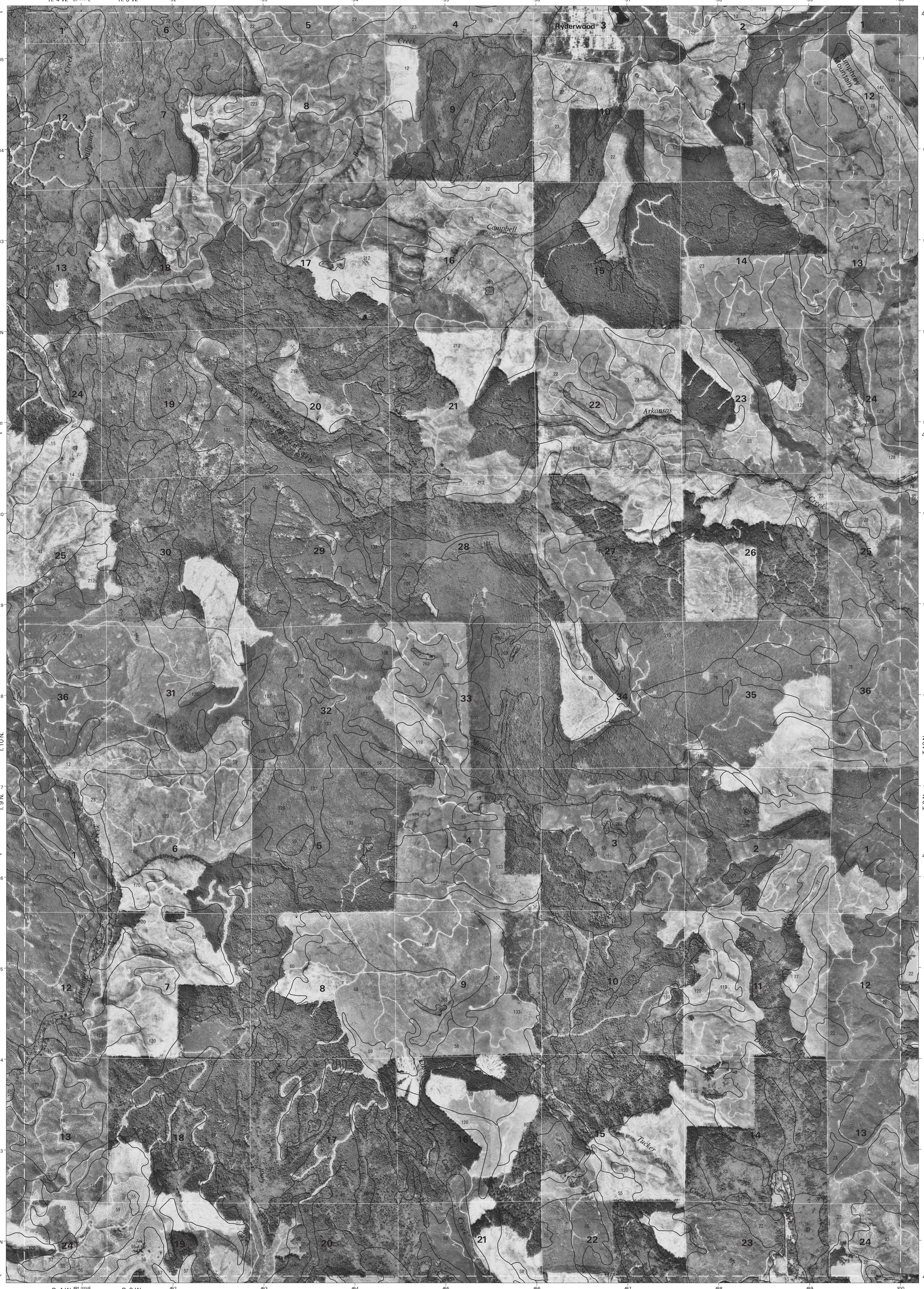
LANDFORM FEATURES
- ESCARPMENTS
  - Bedrock
  - Other than bedrock
- SHORT STEEP SLOPE
- GULLY
- DEPRESSION, closed
- SINKHOLE

EXCAVATIONS
- PITS
  - Borrow pits
  - Gravel pit
  - Mine or quarry
- LANDFILL

MISCELLANEOUS SURFACE FEATURES
- Blowout
- Clay spot
- Gravelly spot
- Lava flow
- Marsh or swamp
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip
- Sodic spot
- Spoil area
- Stony spot
- Very stony spot
- Wet spot

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
ABERNATHY MOUNTAIN QUADRANGLE
SHEET NUMBER 11 OF 41



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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

1	2	3
4		5
6	7	8

1 BOISTFORT PEAK (SHEET 1)
2 WILDWOOD (SHEET 2)
3 WINLOCK (SHEET 3)
4 ELOCHOMAN LAKE (SHEET 10)
5 CASTLE ROCK (SHEET 12)
6 OAK POINT (SHEET 19)
7 COAL CREEK (SHEET 20)
8 KELSO (SHEET 21)

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ABERNATHY MOUNTAIN, WASHINGTON
7.5 MINUTE SERIES
SHEET NUMBER 11 OF 41

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
AMBOY QUADRANGLE
SHEET NUMBER 38 OF 41

122° 30′00″
122° 27′30″
122° 25′00″
122° 22′30″

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

1	2	3
4		5
6	7	8

1 GEORGES PEAK (SHEET 31)
2 LAKEVIEW PEAK (SHEET 32)
3 COUGAR (SHEET 33)
4 ARIEL (SHEET 37)
5 YALE DAM (SHEET 39)
6 BATTLE GROUND
7 YACOLT
8 DOLE

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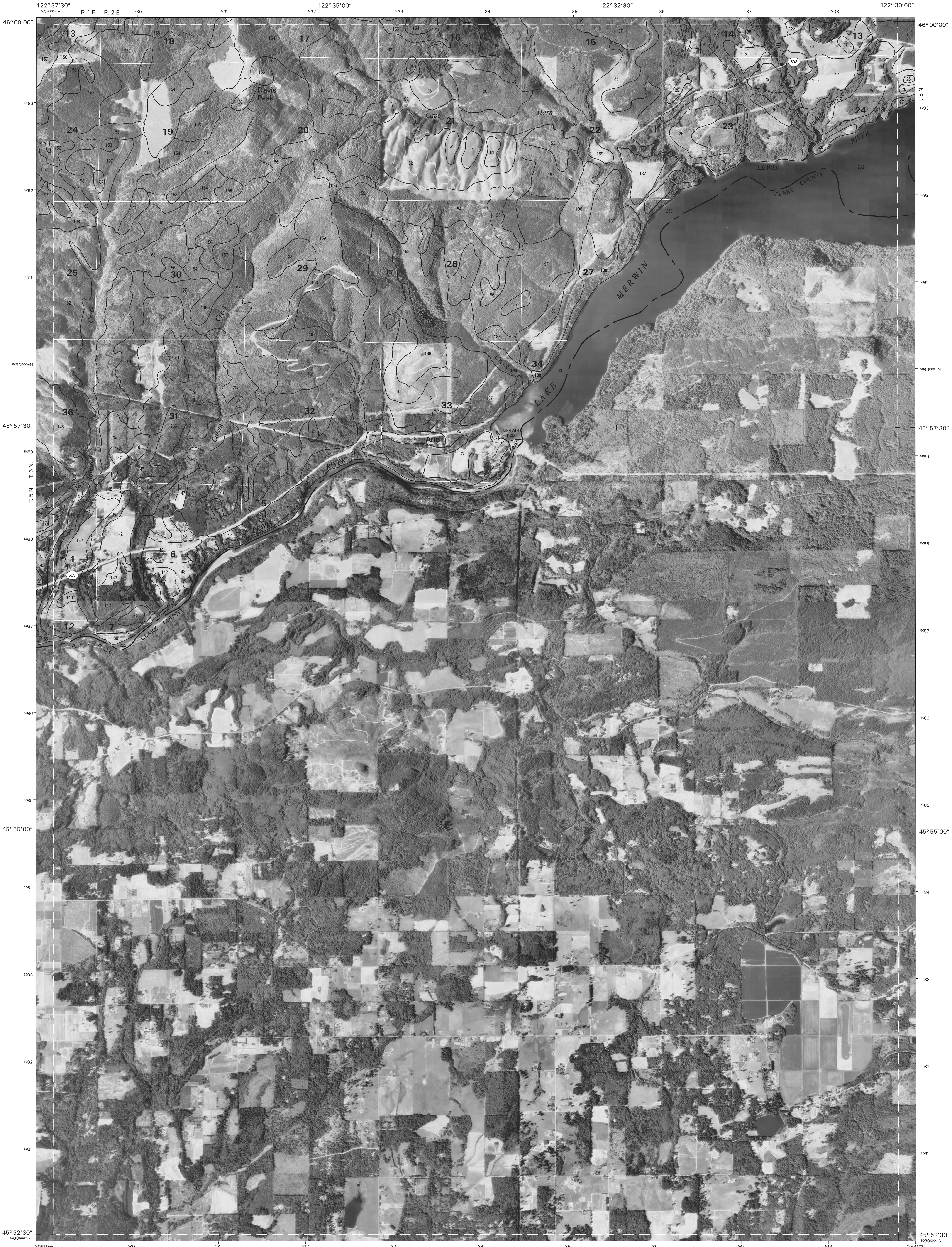
AMBOY, WASHINGTON
7.5 MINUTE SERIES
SHEET NUMBER 38 OF 41

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
ARIEL QUADRANGLE
SHEET NUMBER 37 OF 41



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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

1	2	3
4		5
6	7	8

1 WOOLFORD CREEK (SHEET 30)
2 GEORGES PEAK (SHEET 31)
3 LAKEVIEW PEAK (SHEET 32)
4 WOODLAND (SHEET 36)
5 AMBOY (SHEET 38)
6 RIDGEFIELD (SHEET 41)
7 BATTLE GROUND
8 YACOLT

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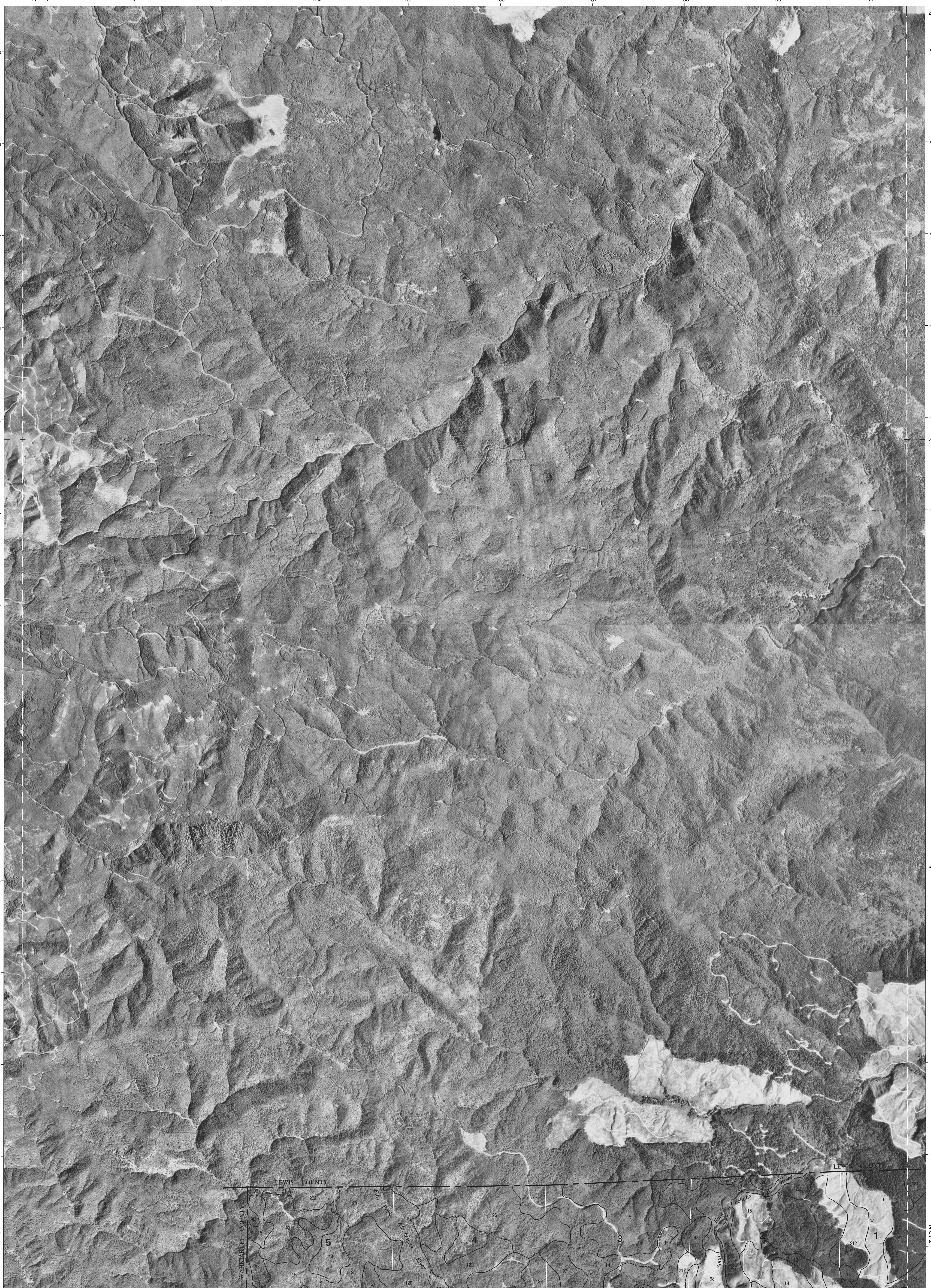
ARIEL, WASHINGTON
7.5 MINUTE SERIES
SHEET NUMBER 37 OF 41

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
BOISTFORT PEAK QUADRANGLE
SHEET NUMBER 1 OF 41



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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

1	2	3
4		5
6	7	8

1 PE ELL
2 BOISTFORT
3 CURTIS
4 ELOCHOMAN PASS
5 WILDWOOD (SHEET 2)
6 SKAMOKAWA PASS
7 ELOCHOMAN LAKE (SHEET 10)
8 ABERNATHY MOUNTAIN (SHEET 11)

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BOISTFORT PEAK, WASHINGTON
7.5 MINUTE SERIES
SHEET NUMBER 1 OF 41

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
CASTLE ROCK QUADRANGLE
SHEET NUMBER 12 OF 41

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 WILDWOOD (SHEET 2)
2 WINLOCK (SHEET 3)
3 TOLEDO (SHEET 4)
4 ABERNATHY MOUNTAIN (SHEET 11)
5 SILVER LAKE (SHEET 13)
6 COAL CREEK (SHEET 20)
7 KELSO (SHEET 21)
8 MOUNT BRYNION (SHEET 22)

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CASTLE ROCK, WASHINGTON
7.5 MINUTE SERIES
SHEET NUMBER 12 OF 41

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES: 1 0 1

FEET: 1000 0 1000 2000 3000 4000 5000 6000 7000

KILOMETERS: 1 0 1

1	2	3
4		5
6	7	8

1 ELOCHOMAN LAKE (SHEET 10)
2 ABERNATHY MOUNTAIN (SHEET 11)
3 CASTLE ROCK (SHEET 12)
4 OAK POINT (SHEET 19)
5 KELSO (SHEET 21)
6 CLATSKANIE
7 DELENA
8 RAINIER (SHEET 28)

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COAL CREEK, WASHINGTON

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
COUGAR QUADRANGLE
SHEET NUMBER 33 OF 41

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 ELK MOUNTAIN (SHEET 25)
2 GOAT MOUNTAIN (SHEET 26)
3 MOUNT SAINT HELENS (SHEET 27)
4 LAKEVIEW PEAK (SHEET 32)
5 MOUNT MITCHELL (SHEET 34)
6 AMBOY (SHEET 38)
7 YALE DAM (SHEET 39)
8 SIOUXON PEAK

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COUGAR, WASHINGTON
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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
COYOTE MOUNTAIN QUADRANGLE
SHEET NUMBER 7 OF 41

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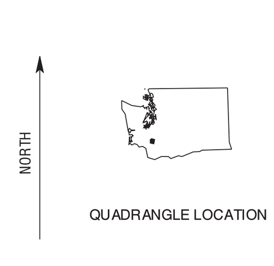

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 MAYFIELD LAKE
2 MOSSYROCK
3 MORTON
4 HATCHET MOUNTAIN (SHEET 6)
5 WINTERS MOUNTAIN (SHEET 8)
6 TOUTLE MOUNTAIN (SHEET 15)
7 HOFFSTADT MOUNTAIN (SHEET 16)
8 ELK ROCK (SHEET 17)

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COYOTE MOUNTAIN, WASHINGTON
7.5 MINUTE SERIES
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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
DEER ISLAND QUADRANGLE
SHEET NUMBER 35 OF 41

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 RAINIER (SHEET 28)
2 KALAMA (SHEET 29)
3 WOOLFORD CREEK (SHEET 30)
4 TRENHOLM
5 WOODLAND (SHEET 36)
6 CHAPMAN
7 SAINT HELENS (SHEET 40)
8 RIDGEFIELD (SHEET 41)

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DEER ISLAND, WASHINGTON
7.5 MINUTE SERIES
SHEET NUMBER 35 OF 41

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
EDEN VALLEY QUADRANGLE
SHEET NUMBER 5 OF 41

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 JACKSON PRAIRIE
2 ONALASKA
3 MAYFIELD LAKE
4 TOLEDO (SHEET 4)
5 HATCHET MOUNTAIN (SHEET 6)
6 SILVER LAKE (SHEET 13)
7 TOUTLE (SHEET 14)
8 TOUTLE MOUNTAIN (SHEET 15)

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
ELK MOUNTAIN QUADRANGLE
SHEET NUMBER 25 OF 41

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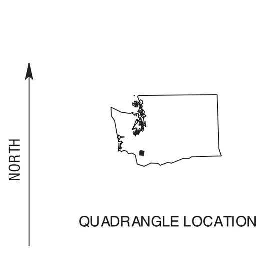

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 TOUTLE MOUNTAIN (SHEET 15)
2 HOFFSTADT MOUNTAIN (SHEET 16)
3 ELK ROCK (SHEET 17)
4 WOLF POINT (SHEET 24)
5 GOAT MOUNTAIN (SHEET 26)
6 GEORGES PEAK (SHEET 31)
7 LAKEVIEW PEAK (SHEET 32)
8 COUGAR (SHEET 33)

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ELK MOUNTAIN, WASHINGTON
7.5 MINUTE SERIES
SHEET NUMBER 25 OF 41

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

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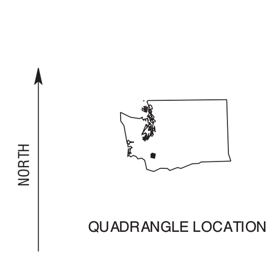

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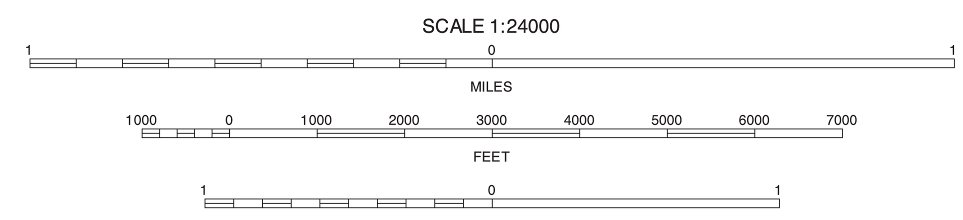

1	2	3
4		5
6	7	8

1 COYOTE MOUNTAIN (SHEET 7)
2 WINTERS MOUNTAIN (SHEET 8)
3 VANSON PEAK (SHEET 9)
4 HOFFSTADT MOUNTAIN (SHEET 16)
5 SPIRIT LAKE WEST (SHEET 18)
6 ELK MOUNTAIN (SHEET 25)
7 GOAT MOUNTAIN (SHEET 26)
8 MOUNT SAINT HELENS (SHEET 27)

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7.5 MINUTE SERIES
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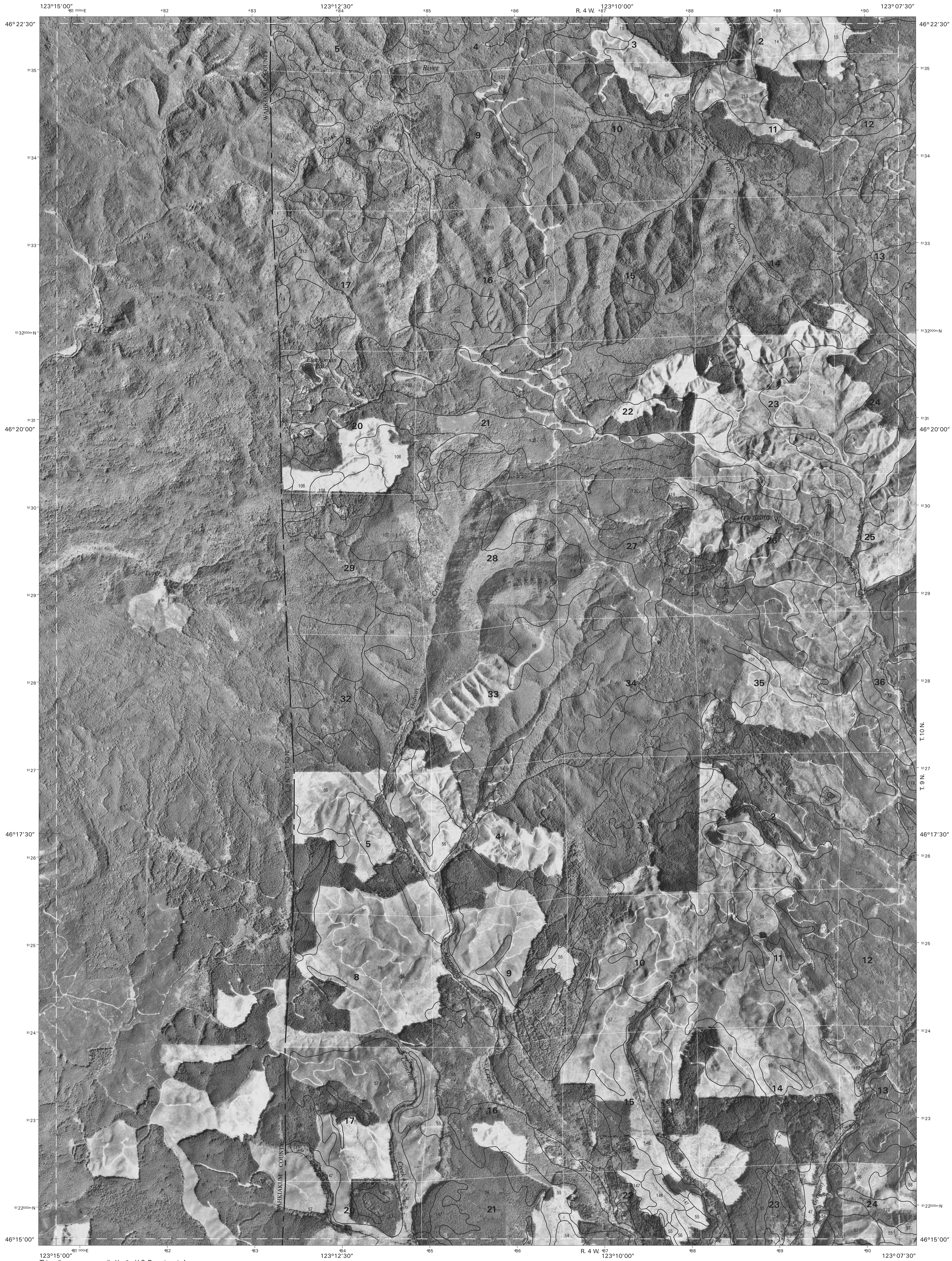
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
ELOCHOMAN LAKE QUADRANGLE
SHEET NUMBER 10 OF 41



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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

1	2	3
4		5
6	7	8

1 ELOCHOMAN PASS
2 BOISTFORT PEAK (SHEET 1)
3 WILDWOOD (SHEET 2)
4 SKAMOKAWA PASS
5 ABERNATHY MOUNTAIN (SHEET 11)
6 NASSA POINT
7 OAK POINT (SHEET 19)
8 COAL CREEK (SHEET 20)

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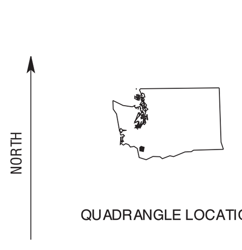
ELOCHOMAN LAKE, WASHINGTON
7.5 MINUTE SERIES
SHEET NUMBER 10 OF 41

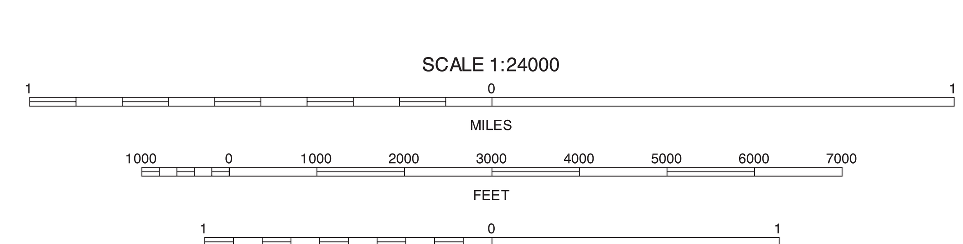
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
GEORGES PEAK QUADRANGLE
SHEET NUMBER 31 OF 41

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS - 80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 10. Coordinate grid ticks and land division data, if shown, are approximately positioned. Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets. Digital data are available for this quadrangle.





1	2	3
4		5
6	7	8

1 HEMLOCK PASS (SHEET 23)
2 WOLF POINT (SHEET 24)
3 ELK MOUNTAIN (SHEET 25)
4 WOOLFORD CREEK (SHEET 30)
5 LAKEVIEW PEAK (SHEET 32)
6 WOODLAND (SHEET 36)
7 ARIEL (SHEET 37)
8 AMBOY (SHEET 38)

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GEORGES PEAK, WASHINGTON
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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
GOAT MOUNTAIN QUADRANGLE
SHEET NUMBER 26 OF 41

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 HOFFSTADT MOUNTAIN (SHEET 16)
2 ELK ROCK (SHEET 17)
3 SPIRIT LAKE WEST (SHEET 18)
4 ELK MOUNTAIN (SHEET 25)
5 MOUNT SAINT HELENS (SHEET 27)
6 LAKEVIEW PEAK (SHEET 32)
7 COUGAR (SHEET 33)
8 MOUNT MITCHELL (SHEET 34)

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
HATCHET MOUNTAIN QUADRANGLE
SHEET NUMBER 6 OF 41

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1 ONALASKA
2 MAYFIELD LAKE
3 MOSSYROCK
4 EDEN VALLEY (SHEET 5)
5 COYOTE MOUNTAIN (SHEET 7)
6 TOUTLE (SHEET 14)
7 TOUTLE MOUNTAIN (SHEET 15)
8 HOFFSTADT MOUNTAIN (SHEET 16)

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HATCHET MOUNTAIN, WASHINGTON
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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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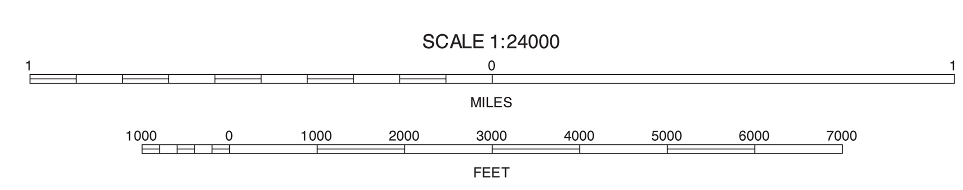
QUADRANGLE LOCATION

SCALE 1:24000



1	2	3
4		5
6	7	8

1 SILVER LAKE (SHEET 13)
2 TOUTLE (SHEET 14)
3 TOUTLE MOUNTAIN (SHEET 15)
4 MOUNT BRYNION (SHEET 22)
5 WOLF POINT (SHEET 24)
6 KALAMA (SHEET 29)
7 WOOLFORD CREEK (SHEET 30)
8 GEORGES PEAK (SHEET 31)

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UNITED STATES
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NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
HOFFSTADT MOUNTAIN QUADRANGLE
SHEET NUMBER 16 OF 41

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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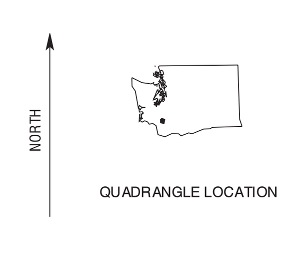

QUADRANGLE LOCATION

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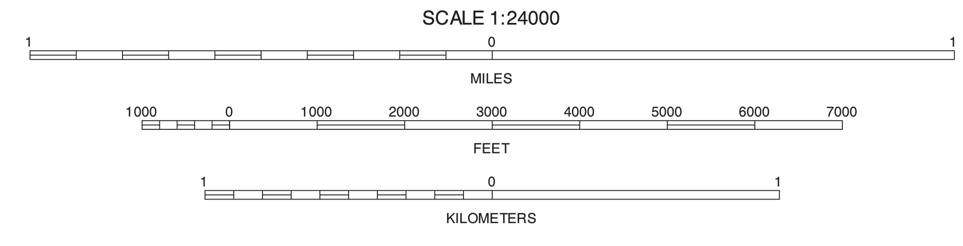

1	2	3
4		5
6	7	8

1 HATCHET MOUNTAIN (SHEET 6)
2 COYOTE MOUNTAIN (SHEET 7)
3 WINTERS MOUNTAIN (SHEET 8)
4 TOUTLE MOUNTAIN (SHEET 15)
5 ELK ROCK (SHEET 17)
6 WOLF POINT (SHEET 24)
7 ELK MOUNTAIN (SHEET 25)
8 GOAT MOUNTAIN (SHEET 26)

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HOFFSTADT MOUNTAIN, WASHINGTON
7.5 MINUTE SERIES
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This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1 KELSO (SHEET 21)
2 MOUNT BRYNION (SHEET 22)
3 HEMLOCK PASS (SHEET 23)
4 RAINIER (SHEET 28)
5 WOOLFORD CREEK (SHEET 30)
6 TRENHOLM
7 DEER ISLAND (SHEET 35)
8 WOODLAND (SHEET 36)

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UNITED STATES
DEPARTMENT OF AGRICULTURE
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COWLITZ COUNTY, WASHINGTON
KELSO QUADRANGLE
SHEET NUMBER 21 OF 41

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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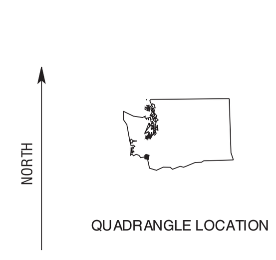

QUADRANGLE LOCATION

SCALE 1:24000

MILES 1 0 1

FEET 1000 0 1000 2000 3000 4000 5000 6000 7000

KILOMETERS 1 0 1

1	2	3
4		5
6	7	8

1 ABERNATHY MOUNTAIN (SHEET 11)
2 CASTLE ROCK (SHEET 12)
3 SILVER LAKE (SHEET 13)
4 COAL CREEK (SHEET 20)
5 MOUNT BRYNION (SHEET 22)
6 DELENA
7 RAINIER (SHEET 28)
8 KALAMA (SHEET 29)

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
LAKEVIEW PEAK QUADRANGLE
SHEET NUMBER 32 OF 41

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 WOLF POINT (SHEET 24)
2 ELK MOUNTAIN (SHEET 25)
3 GOAT MOUNTAIN (SHEET 26)
4 GEORGES PEAK (SHEET 31)
5 COUGAR (SHEET 33)
6 ARIEL (SHEET 37)
7 AMBOY (SHEET 38)
8 YALE DAM (SHEET 39)

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LAKEVIEW PEAK, WASHINGTON
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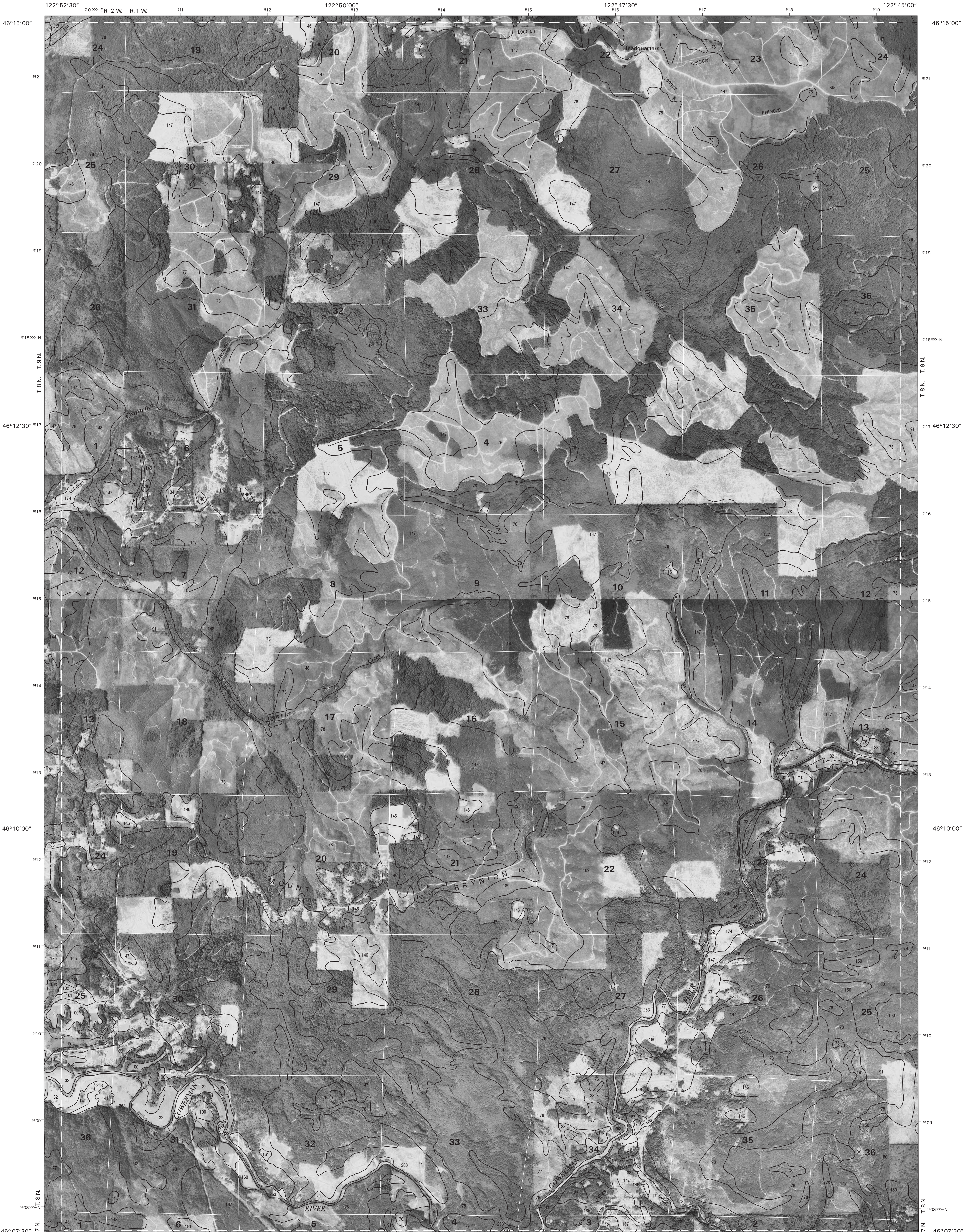
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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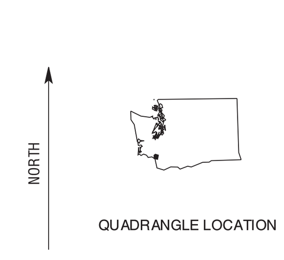

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 CASTLE ROCK (SHEET 12)
2 SILVER LAKE (SHEET 13)
3 TOUTLE (SHEET 14)
4 KELSO (SHEET 21)
5 HEMLOCK PASS (SHEET 23)
6 RAINIER (SHEET 28)
7 KALAMA (SHEET 29)
8 WOOLFORD CREEK (SHEET 30)

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
MOUNT MITCHELL QUADRANGLE
SHEET NUMBER 34 OF 41

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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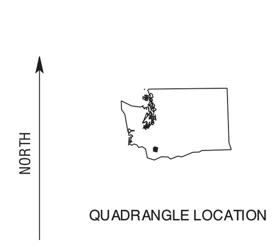
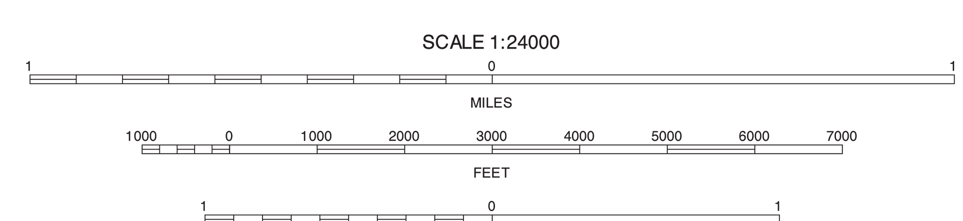


QUADRANGLE LOCATION

SCALE 1:24000



1	2	3
4		5
6	7	8

1 GOAT MOUNTAIN (SHEET 26)
2 MOUNT SAINT HELENS (SHEET 27)
3 SMITH CREEK BUTTE
4 COUGAR (SHEET 33)
5 CEDAR FLATS
6 YALE DAM (SHEET 39)
7 SIOUXON PEAK
8 BARE MOUNTAIN

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MOUNT MITCHELL, WASHINGTON
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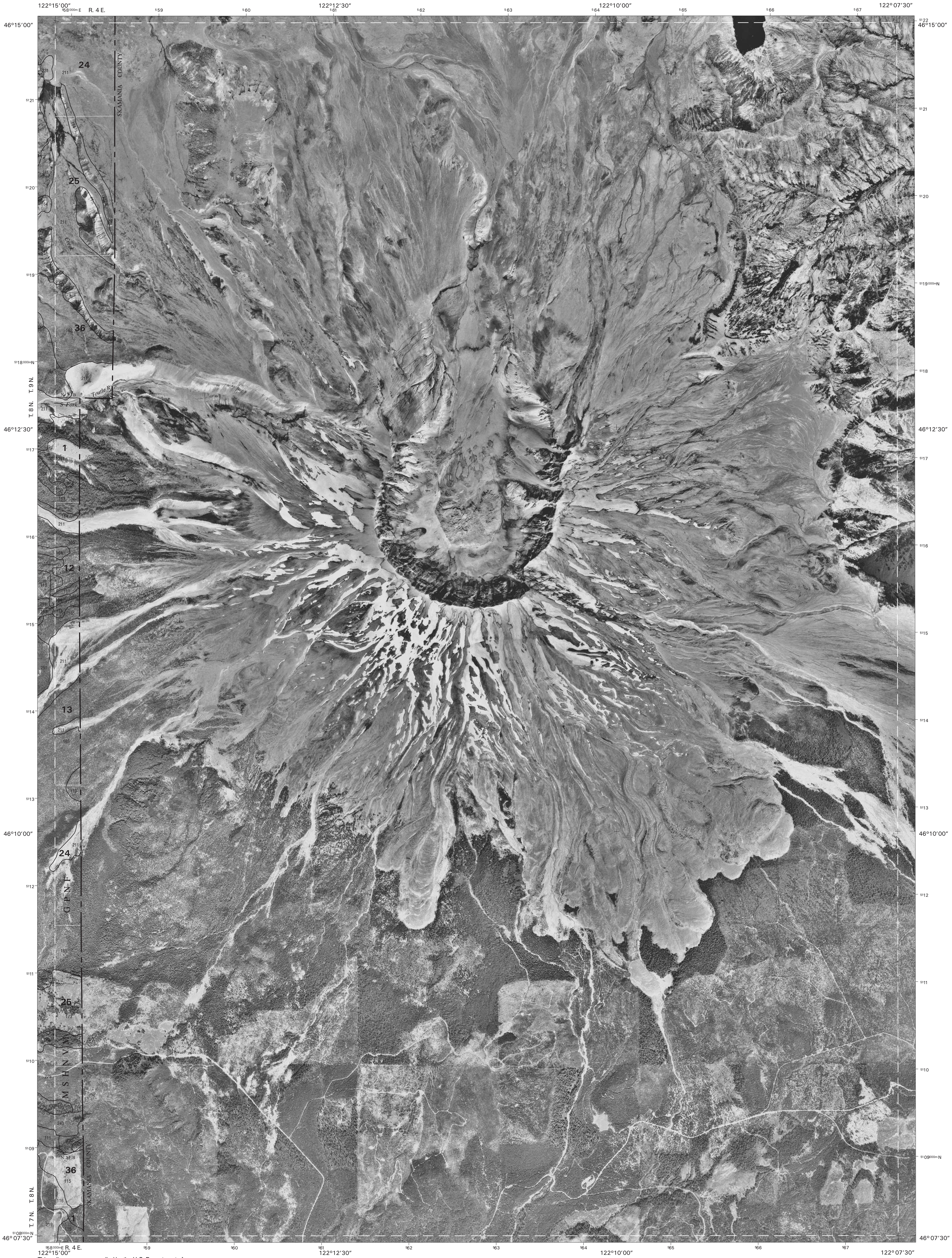
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
MOUNT SAINT HELENS QUADRANGLE
SHEET NUMBER 27 OF 41



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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 ELK ROCK (SHEET 17)
2 SPIRIT LAKE WEST (SHEET 18)
3 SPIRIT LAKE EAST
4 GOAT MOUNTAIN (SHEET 26)
5 SMITH CREEK BUTTE
6 COUGAR (SHEET 33)
7 MOUNT MITCHELL (SHEET 34)
8 CEDAR FLATS

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MOUNT SAINT HELENS, WASHINGTON
7.5 MINUTE SERIES
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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
OAK POINT QUADRANGLE
SHEET NUMBER 19 OF 41

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 SKAMOKAWA PASS
2 ELOCHOMAN LAKE (SHEET 10)
3 ABERNATHY MOUNTAIN (SHEET 11)
4 NASSA POINT
5 COAL CREEK (SHEET 20)
6 MARSHLAND
7 CLATSKANIE
8 DELENA

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OAK POINT, WASHINGTON
7.5 MINUTE SERIES
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UNITED STATES
DEPARTMENT OF AGRICULTURE
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COWLITZ COUNTY, WASHINGTON
RAINIER QUADRANGLE
SHEET NUMBER 28 OF 41

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 COAL CREEK (SHEET 20)
2 KELSO (SHEET 21)
3 MOUNT BRYNION (SHEET 22)
4 DELENA
5 KALAMA (SHEET 29)
6 BAKER POINT
7 TRENHOLM
8 DEER ISLAND (SHEET 35)

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UNITED STATES
DEPARTMENT OF AGRICULTURE
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COWLITZ COUNTY, WASHINGTON
RIDGEFIELD QUADRANGLE
SHEET NUMBER 41 OF 41

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 DEER ISLAND (SHEET 35)
2 WOODLAND (SHEET 36)
3 ARIEL (SHEET 37)
4 SAINT HELENS (SHEET 40)
5 BATTLE GROUND
6 SAUVIE ISLAND
7 VANCOUVER
8 ORCHARDS

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
SAINT HELENS QUADRANGLE
SHEET NUMBER 40 OF 41

122° 52′30″ 122° 50′00″ 122° 47′30″ R. 1 W. 122° 45′00″

45° 52′30″

T. 4 N. T. 5 N.

45° 50′00″

45° 47′30″

45° 45′00″

122° 52′30″ 122° 50′00″ 122° 47′30″ 122° 45′00″

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

1	2	3
4		5
6	7	8

1 TRENHOLM
2 DEER ISLAND (SHEET 35)
3 WOODLAND (SHEET 36)
4 CHAPMAN
5 RIDGEFIELD (SHEET 41)
6 DIXIE MOUNTAIN
7 SAUVIE ISLAND
8 VANCOUVER

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SAINT HELENS, WASHINGTON
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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
SILVER LAKE QUADRANGLE
SHEET NUMBER 13 OF 41

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

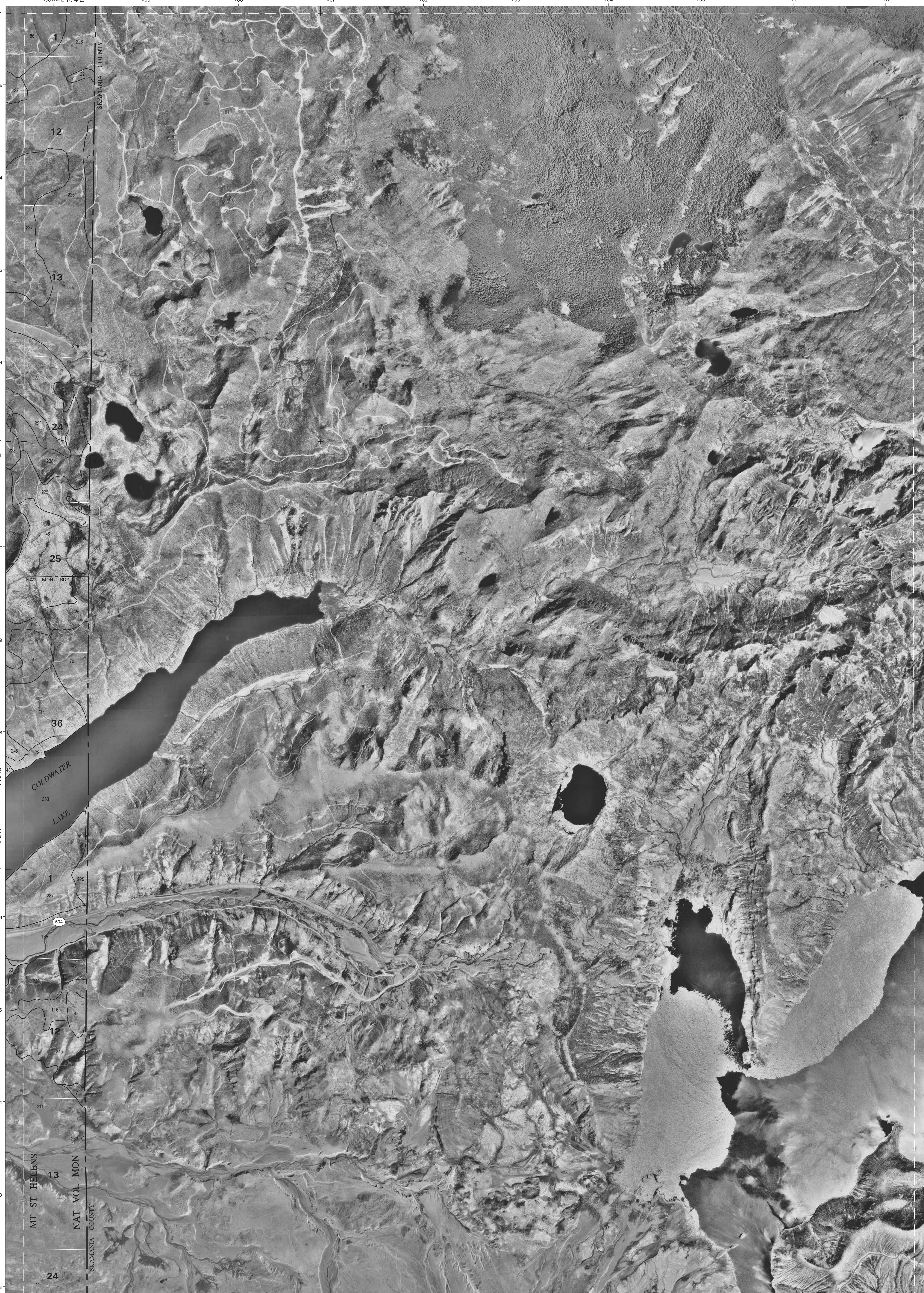
INDEX TO ADJOINING 7.5 MAPS

1 WINLOCK (SHEET 3)
2 TOLEDO (SHEET 4)
3 EDEN VALLEY (SHEET 5)
4 CASTLE ROCK (SHEET 12)
5 TOUTLE (SHEET 14)
6 KELSO (SHEET 21)
7 MOUNT BRYNION (SHEET 22)
8 HEMLOCK PASS (SHEET 23)

SILVER LAKE, WASHINGTON
7.5 MINUTE SERIES
SHEET NUMBER 13 OF 41

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
SPIRIT LAKE WEST QUADRANGLE
SHEET NUMBER 18 OF 41



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

1	2	3
4		5
6	7	8

1 WINTERS MOUNTAIN (SHEET 8)
2 VANSON PEAK (SHEET 9)
3 COWLITZ FALLS
4 ELK ROCK (SHEET 17)
5 SPIRIT LAKE EAST
6 GOAT MOUNTAIN (SHEET 26)
7 MOUNT SAINT HELENS (SHEET 27)
8 SMITH CREEK BUTTE

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SPIRIT LAKE WEST, WASHINGTON
7.5 MINUTE SERIES
SHEET NUMBER 18 OF 41

122°52'30"

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 NAPAVINE
2 JACKSON PRAIRIE
3 ONALASKA
4 WINLOCK (SHEET 3)
5 EDEN VALLEY (SHEET 5)
6 CASTLE ROCK (SHEET 12)
7 SILVER LAKE (SHEET 13)
8 TOUTLE (SHEET 14)

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TOLEDO, WASHINGTON
7.5 MINUTE SERIES
SHEET NUMBER 4 OF 41

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
TOUTLE MOUNTAIN QUADRANGLE
SHEET NUMBER 15 OF 41

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1 EDEN VALLEY (SHEET 5)
2 HATCHET MOUNTAIN (SHEET 6)
3 COYOTE MOUNTAIN (SHEET 7)
4 TOUTLE (SHEET 14)
5 HOFFSTADT MOUNTAIN (SHEET 16)
6 HEMLOCK PASS (SHEET 23)
7 WOLF POINT (SHEET 24)
8 ELK MOUNTAIN (SHEET 25)

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TOUTLE MOUNTAIN, WASHINGTON
7.5 MINUTE SERIES
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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
TOUTLE QUADRANGLE
SHEET NUMBER 14 OF 41

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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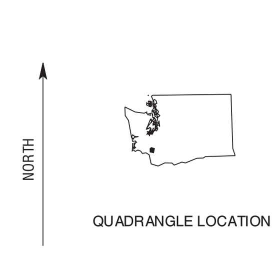

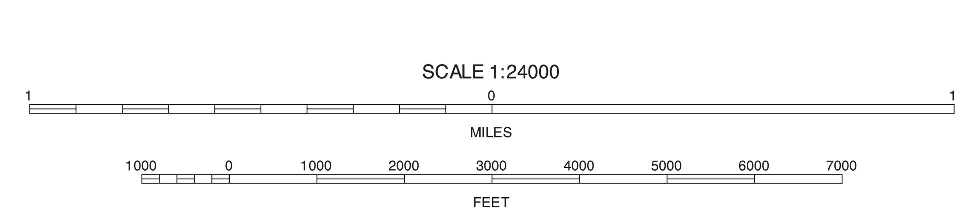

1	2	3
4		5
6	7	8

1 TOLEDO (SHEET 4)
2 EDEN VALLEY (SHEET 5)
3 HATCHET MOUNTAIN (SHEET 6)
4 SILVER LAKE (SHEET 13)
5 TOUTLE MOUNTAIN (SHEET 15)
6 MOUNT BRYNION (SHEET 22)
7 HEMLOCK PASS (SHEET 23)
8 WOLF POINT (SHEET 24)

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7.5 MINUTE SERIES
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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
VANSON PEAK QUADRANGLE
SHEET NUMBER 9 OF 41

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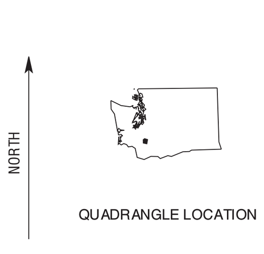
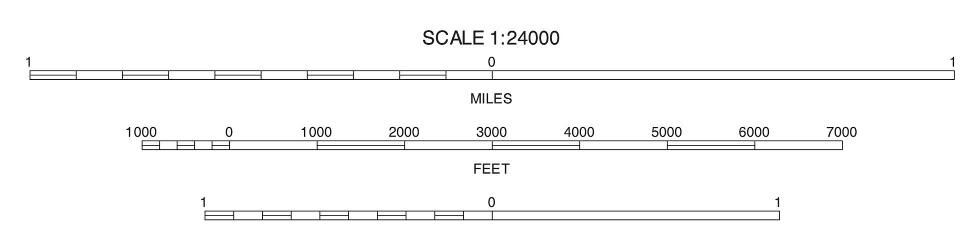


QUADRANGLE LOCATION

SCALE 1:24000



1	2	3
4		5
6	7	8

1 MORTON
2 GLENOMA
3 KIONA PEAK
4 WINTERS MOUNTAIN (SHEET 8)
5 COWLITZ FALLS
6 ELK ROCK (SHEET 17)
7 SPIRIT LAKE WEST (SHEET 18)
8 SPIRIT LAKE EAST

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VANSON PEAK, WASHINGTON
7.5 MINUTE SERIES
SHEET NUMBER 9 OF 41

Soil Survey of Cowlitz County, Washington

CD-ROM Version April 2006

Welcome! This CD contains information about the soils of Cowlitz County, Washington. Click on a subject of interest or browse the CD to view the files.

Soil Survey Manuscript

This document contains general information about the survey area, the general and detailed soil map unit descriptions, the taxonomic unit descriptions, and the soil interpretation and soil properties tables.

General Soil Map

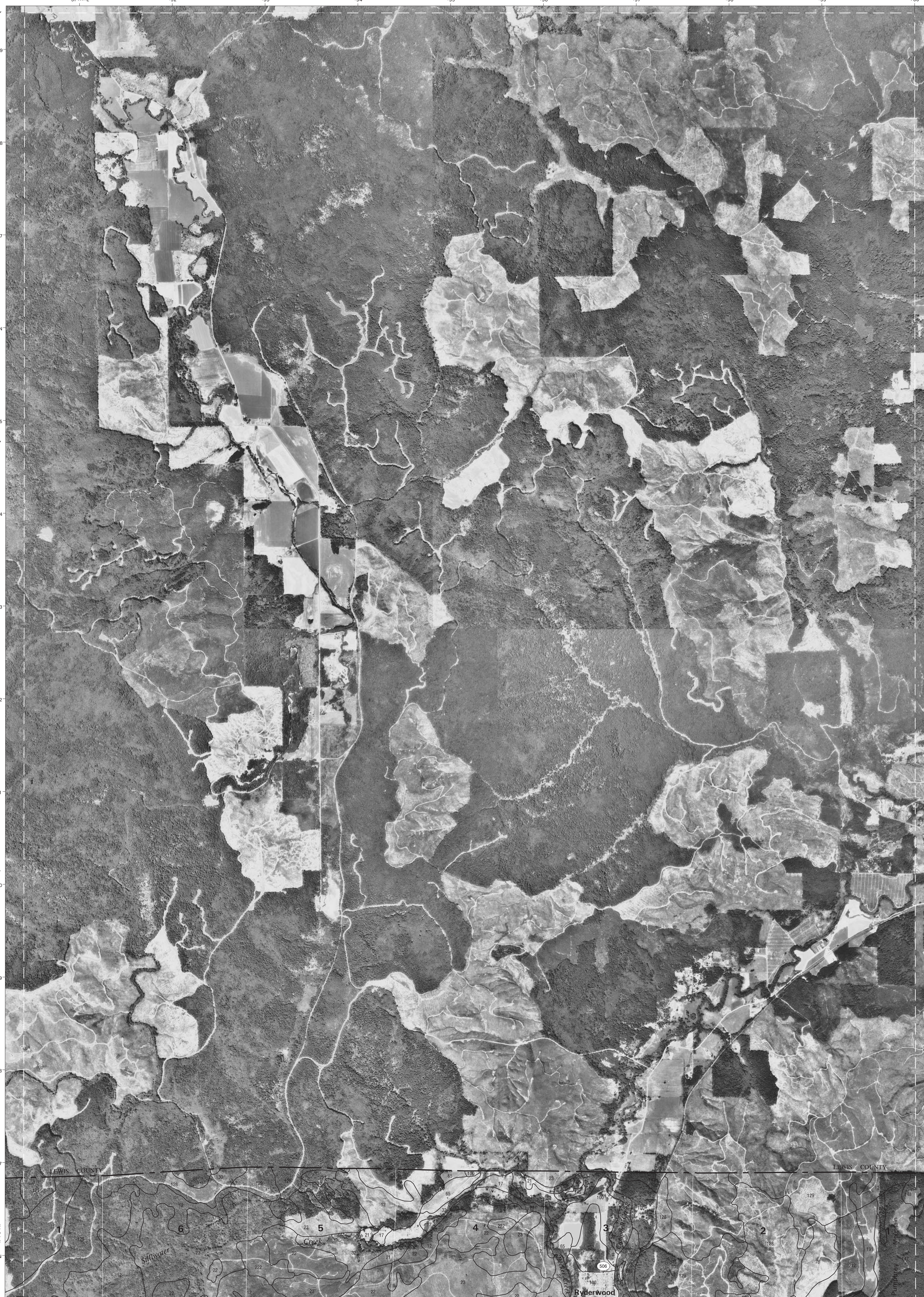
The general soil map shows the survey area divided into groups of associated soils called general soil map units. This map is useful for planning the use and management of large areas. Click on the general soil map unit names in the legend to view the map unit descriptions.

Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas. From the Index to Map Sheets, click on any quadrangle to view the soil delineations and map unit symbols in the survey area. For instructions on printing the maps, click here. For instructions on split-screen viewing, click here.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
WILDWOOD QUADRANGLE
SHEET NUMBER 2 OF 41



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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 BOISTFORT
2 CURTIS
3 NAPAVINE
4 BOISTFORT PEAK (SHEET 1)
5 WINLOCK (SHEET 3)
6 ELOCHOMAN LAKE (SHEET 10)
7 ABERNATHY MOUNTAIN (SHEET 11)
8 CASTLE ROCK (SHEET 12)

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WILDWOOD, WASHINGTON
7.5 MINUTE SERIES
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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 CURTIS
2 NAPAVINE
3 JACKSON PRAIRIE
4 WILDWOOD (SHEET 2)
5 TOLEDO (SHEET 4)
6 ABERNATHY MOUNTAIN (SHEET 11)
7 CASTLE ROCK (SHEET 12)
8 SILVER LAKE (SHEET 13)

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WINLOCK, WASHINGTON

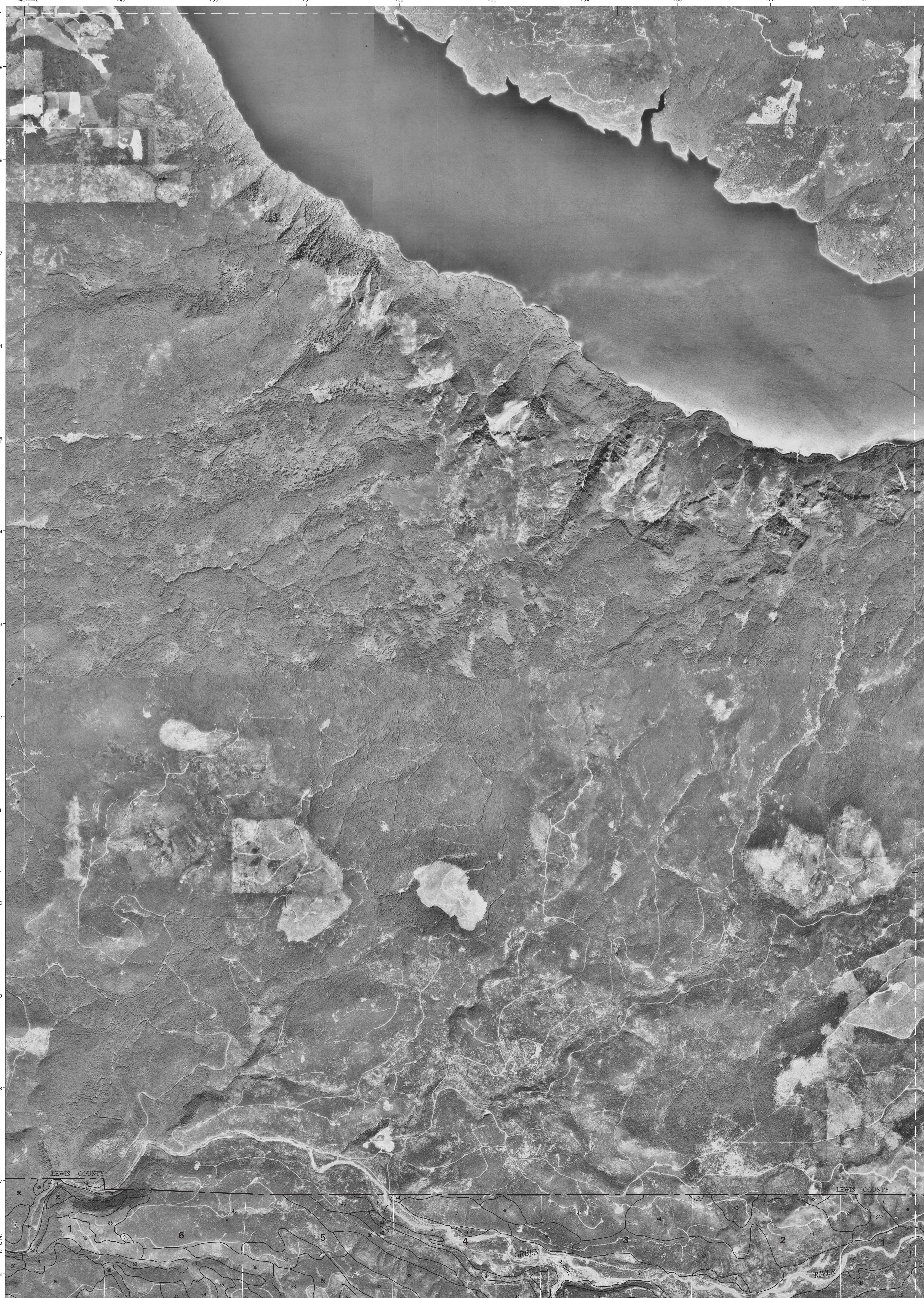
7.5 MINUTE SERIES
SHEET NUMBER 3 OF 41

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
WINTERS MOUNTAIN QUADRANGLE
SHEET NUMBER 8 OF 41

122° 22′30″ 122° 20′00″ 122° 17′30″ 122° 15′00″

46° 30′00″



46° 27′30″
46° 25′00″
46° 22′30″

$^{5}48^{000m}$E R. 3 E. $^{5}49$ R. 4 E. $^{5}50$ $^{5}51$ $^{5}52$ $^{5}53$ $^{5}54$ $^{5}55$ $^{5}56$ $^{5}57$

122° 22′30″ 122° 20′00″ 122° 17′30″ 122° 15′00″

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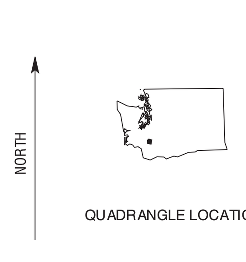

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

1	2	3
4		5
6	7	8

1 MOSSYROCK
2 MORTON
3 GLENOMA
4 COYOTE MOUNTAIN (SHEET 7)
5 VANSON PEAK (SHEET 9)
6 HOFFSTADT MOUNTAIN (SHEET 16)
7 ELK ROCK (SHEET 17)
8 SPIRIT LAKE WEST (SHEET 18)

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WINTERS MOUNTAIN, WASHINGTON
7.5 MINUTE SERIES
SHEET NUMBER 8 OF 41

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
WOLF POINT QUADRANGLE
SHEET NUMBER 24 OF 41

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1989 - 1995 aerial photography. Culture was acquired from U.S. Department of Interior, Geological Survey. Public land survey system (PLSS) was acquired from Washington Department of Natural Resources. PLSS was edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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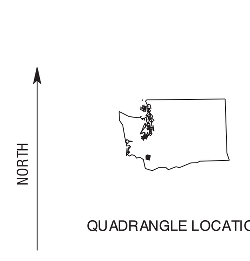

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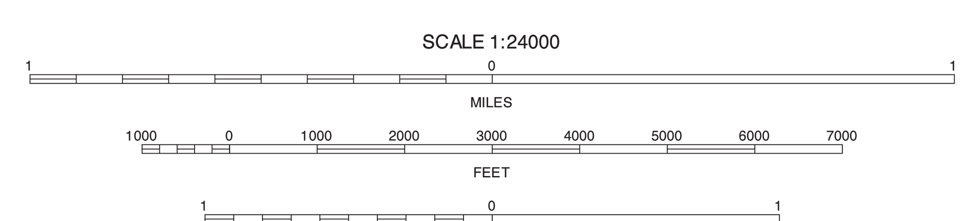

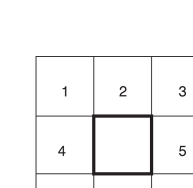

1 TOUTLE (SHEET 14)
2 TOUTLE MOUNTAIN (SHEET 15)
3 HOFFSTADT MOUNTAIN (SHEET 16)
4 HEMLOCK PASS (SHEET 23)
5 ELK MOUNTAIN (SHEET 25)
6 WOOLFORD CREEK (SHEET 30)
7 GEORGES PEAK (SHEET 31)
8 LAKEVIEW PEAK (SHEET 32)

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WOLF POINT, WASHINGTON
7.5 MINUTE SERIES
SHEET NUMBER 24 OF 41

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
WOODLAND QUADRANGLE
SHEET NUMBER 36 OF 41

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 KALAMA (SHEET 29)
2 WOOLFORD CREEK (SHEET 30)
3 GEORGES PEAK (SHEET 31)
4 DEER ISLAND (SHEET 35)
5 ARIEL (SHEET 37)
6 SAINT HELENS (SHEET 40)
7 RIDGEFIELD (SHEET 41)
8 BATTLE GROUND

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WOODLAND, WASHINGTON
7.5 MINUTE SERIES
SHEET NUMBER 36 OF 41

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
WOOLFORD CREEK QUADRANGLE
SHEET NUMBER 30 OF 41

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NORTH

QUADRANGLE LOCATION

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

1	2	3
4		5
6	7	8

1 MOUNT BRYNION (SHEET 22)
2 HEMLOCK PASS (SHEET 23)
3 WOLF POINT (SHEET 24)
4 KALAMA (SHEET 29)
5 GEORGES PEAK (SHEET 31)
6 DEER ISLAND (SHEET 35)
7 WOODLAND (SHEET 36)
8 ARIEL (SHEET 37)

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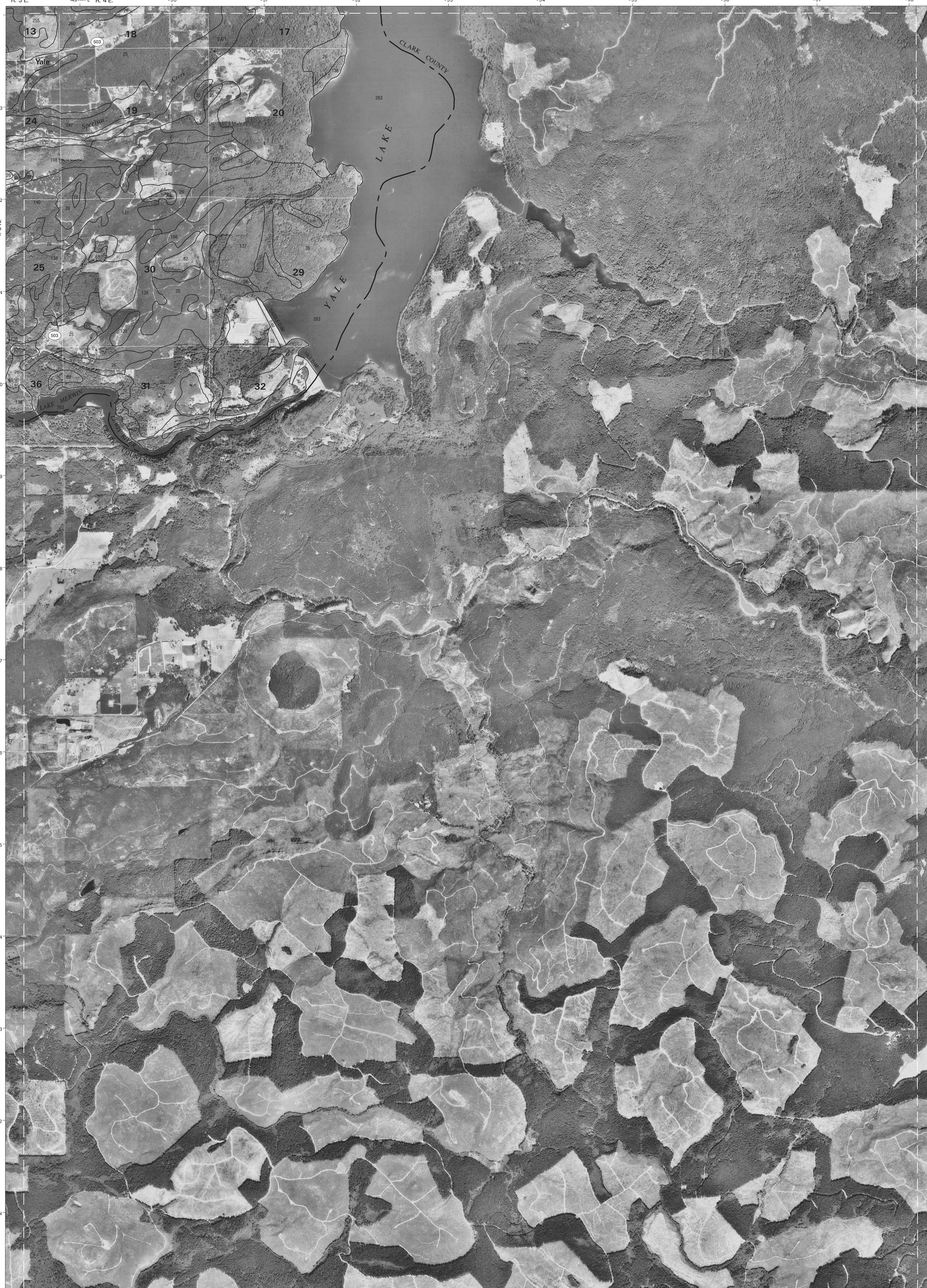
WOOLFORD CREEK, WASHINGTON
7.5 MINUTE SERIES
SHEET NUMBER 30 OF 41

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

COWLITZ COUNTY, WASHINGTON
YALE DAM QUADRANGLE
SHEET NUMBER 39 OF 41



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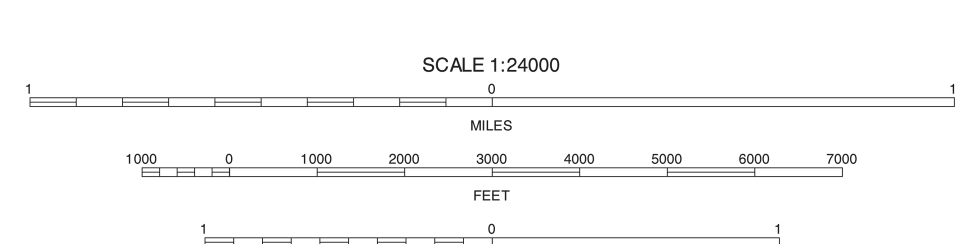

1	2	3
4		5
6	7	8

1 LAKEVIEW PEAK (SHEET 32)
2 COUGAR (SHEET 33)
3 MOUNT MITCHELL (SHEET 34)
4 AMBOY (SHEET 38)
5 SIOUXON PEAK
6 YACOLT
7 DOLE
8 GUMBOOT MOUNTAIN

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